MODERN
Machine Shop

HOWARD CAMPBELL, Editor

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MODERN
Machine Shop

CINCINNATI, OHIO VOL. 7, NO. 10

MARCH, 1935

A Trip Through the Cleveland Tractor Plant, I

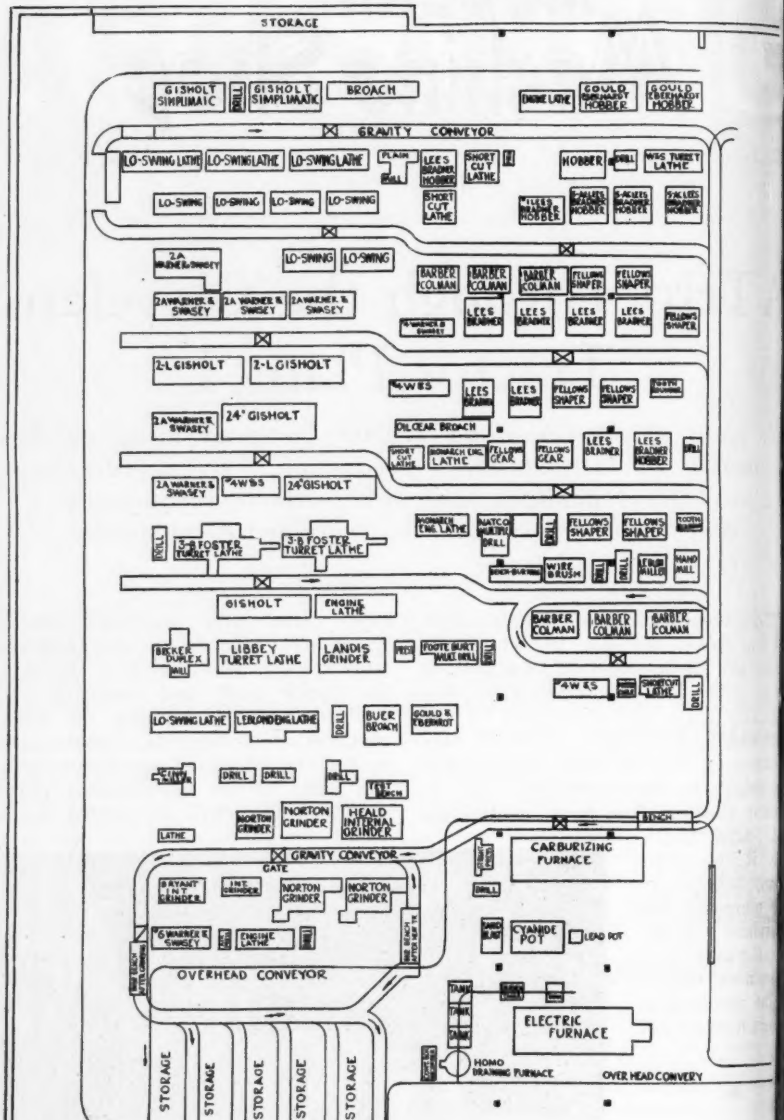
The plant of the Cleveland Tractor Company is an excellent example of "straight-line" production. By coordinating mechanical handling with the production equipment, materials are moved systematically and economically.

BY HOWARD CAMPBELL

THE ideal plan for a manufacturing plant is one in which all parts are processed in progressive order, with the parts passing automatically from each operation to the next and arriving at their final destinations in the assembly lines without delays or back-tracking. Due to various reasons this ideal is difficult of attainment, but it is very nearly reached in the plant of the Cleveland Tractor Company, Cleveland, Ohio.

The production departments occupy three large buildings, two of which are devoted to the manufacture of light parts, and the third, to the heavy parts and assembly. The equipment for processing the heavy castings and other large parts is so placed that the final operations bring the parts to the approximate points at which they will be needed in the

Fig. 1—View of the motor truck aisle which serves the gear department.


STORAGE
GISHOLT SIMPLIMAIC
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BROACH
ENGINE LATHE
GOULD EBERHARDT HOBBER
GOULD EBERHARDT HOBBER
GRAVITY CONVEYOR
LO-SWING LATHE
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PLAIN DRILL
LEES BRADNER HOBBER
SHORT CUT LATHE
HOBBER
DRILL
W&S TURRET LATHE
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LEES BRADNER HOBBER
2A WARNER & SWASEY
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2A WARNER & SWASEY
24" GISHOLT
OIL GEAR BROACH
SHORT CUT LATHE
BROACH ENG.
LATHE
FELLOWS GEAR
FELLOWS GEAR
LEES BRADNER
LEES BRADNER HOBBER
DRILL
2A WARNER & SWASEY
4 W&S
24" GISHOLT
MONNIER ENG. LATHE
MATCO MULTIPLE DRILL
DRILL
FELLOWS SHAPER
FELLOWS SHAPER
DRILL
3-B FOSTER TURRET LATHE
3-B FOSTER TURRET LATHE
WIRE BRUSH
DRILL
DRILL
HAND MILLER
HAND MILL
GISHOLT
ENGINE LATHE
BARBER COLMAN
BARBER COLMAN
BARBER COLMAN
BEKER DUPLEX
DRILL
LIBBEY TURRET LATHE
LANDIS GRINDER
PRESS
FOOTE BURT MULTIPLE DRILL
DRILL
4 W&S
SHORT CUT LATHE
DRILL
LO-SWING LATHE
LEBLOND ENG. LATHE
DRILL
BUER BROACH
GOULD & EBERHOT
DRILL
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DRILL
TEST BENCH
LATHE
NORTON GRINDER
NORTON GRINDER
HEALD INTERNAL GRINDER
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GRAVITY CONVEYOR
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CARBURIZING FURNACE
DRILL
BRYANT INT. GRINDER
INT. GRINDER
NORTON GRINDER
NORTON GRINDER
6 WARNER & SWASEY
DRILL
ENGINE LATHE
DRILL
SAND BLAST
CYANIDE POT
LEAD POT
OVERHEAD CONVEYOR
TANK
TANK
TANK
ELECTRIC FURNACE
STORAGE
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STORAGE
HOMO DRAWING FURNACE
OVER HEAD CONVEYOR
MOTOR TRUCK AISLE

assemblies, while the light parts are transported from the first building to the second and to their respective places in the assembly lines by an overhead

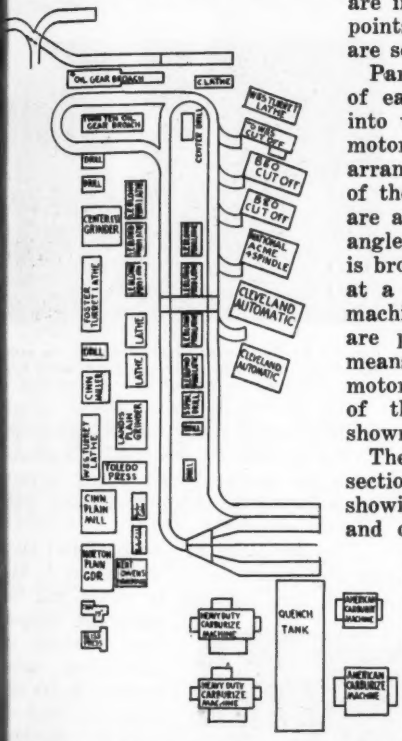

Fig. 2—This drawing and the one on the opposite page comprise the layout of the gear department and track department, showing arrangement of production machines and conveyor lines.

endless conveyor which is 1495 feet long.

Castings, forgings, and other forms of stock are brought into the plant by motor truck and are unloaded at points adjacent to the first-operation machines. Large castings are stacked on the floor and the smaller parts are stored in bins built especially for the parts for which they are to be used. Stockrooms have practically been eliminated, and the production is so regulated that the inventory of rough and finished stock is maintained at the minimum at all times. Heat treat furnaces, instead of being located in a separate department, are included in the production lines at the points where the heat treat operations are scheduled to occur.

Paralleling the inside of the east wall of each major building is a 10-foot aisle into which the rough stock is brought by motor truck. Beginning at this aisle, and arranged according to the logical sequence of the operations, the production machines are aligned crosswise of the shop at right angles to the aisle. As each lot of parts is brought into the building, it is deposited at a point adjacent to the first-operation machine and as the successive operations are performed, the parts are moved by means of the conveyors. A view of the motor truck aisle in the gear department of the miscellaneous parts building is shown in Fig. 1.

The plan view Fig. 2 is a layout of a section of the building referred to above, showing the arrangement of the machines and conveyors across the shop. The conveyors are largely of the gravity roller type, as can be seen by reference to the photograph Fig. 3. This illustration shows the double line of "Simplimatic" and "Lo-Swing" lathes directly adjacent to the entrance of the building. These machines are used to machine shafts and similar cylindrical work. The operator on the first machine picks up the stock from the pile that has been placed there by the truckman and as the consecutive operations are performed the pieces are moved along on the conveyor from one machine to the next.

Each double line of machines feeds a conveyor, as shown in the layout, "feeder" conveyors from each side of the room connecting with a trunk line conveyor, shown in Fig. 4, which extends lengthwise through the center of the room. Upon this trunk line the parts are moved to inspec-

tion, heat treatment, and eventually to the point at which they are placed on the overhead conveyor to be carried to the assembly department in the final building.

Another section of the plant is shown in Fig. 5, showing the manner in which the plan described above is carried out. At this point bins are built along the motor truck aisle into which the parts can be stored to be removed as they are required by the operators on the first-operation machines. The parts shown in this illustration are track wheels, eight to twelve of which carry the weight of the tractor on to the track.

One of the most interesting features of the plant is the heat treating equipment. In Fig 6 is shown a view of one group of heat treating furnaces that are included in the equipment of the miscellaneous parts building. At the left is one of four rotary furnaces in which rollers, bushings, and other parts are carburized. Two of the furnaces are gas-fired and two are electrically-heated. Natural gas is used as the carburizing agent, eliminating the need for carburizing boxes and materials.

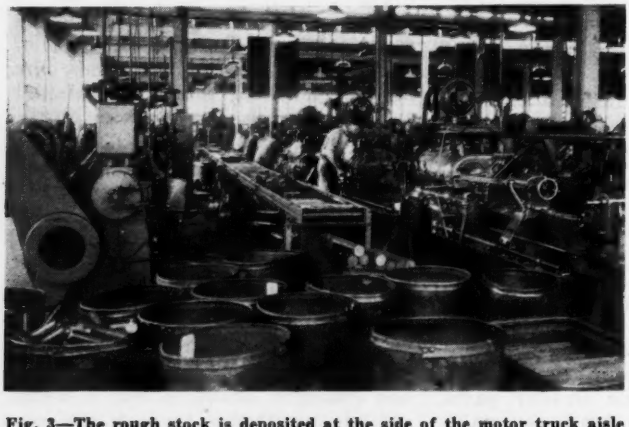

Fig. 3—The rough stock is deposited at the side of the motor truck aisle where it is within easy reach of the operator on the first-operation machine. As each succeeding operation is performed, the stock is passed on to the next machine by means of the conveyor.

Rollers and bushings are carburized to a depth of from 0.040 to 0.090 inch according to the dimensions of the piece and the task that will be required of it. Retort temperatures are held at 1700 deg. F. by auto-

Fig. 4—At the center of the building the parts pass to a trunk line conveyor upon which they are conveyed to inspection and heat treat.

matic potentiometer controllers which give a permanent record of temperatures for each charge. Each furnace has a capacity of approximately 1000 pounds of parts.

The furnaces are so designed that, as the carburizing operation is finished, the furnace is tilted and the parts are dumped into baskets in quenching tanks located under the floor in front of each furnace. After quenching, the baskets of parts are picked up by a monorail crane and carried to an electric hardening furnace of the pusher type, shown in the background of the picture. This furnace has a capacity of 800 pounds per hour. It is divided into

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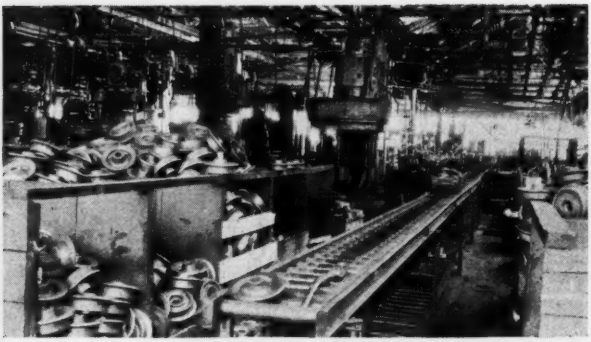


Fig. 5—Beginning at the end of the conveyor adjacent to the motor truck aisle, the parts move toward the assembly department with each succeeding operation.

two zones and is operated under full temperature control in accordance with the requirements for the parts being treated.

Upon reaching the temperature required for hardening, the parts are discharged into a caustic soda quenching bath and are then picked up from the bottom of the tank by a conveyor which passes them through a rinsing tank and discharges them into hoppers ready to be moved to the assembly department.

Gears and shafts are hardened in a conveyor hearth 100-kw. electric furnace having a capacity of 800 pounds per hour. This furnace is also divided into two zones and operates under full automatic control of temperatures from 1350 deg. F. to 1550 deg. F. as required by the parts in process. The speed of the conveyor hearth may be varied also.

Track shoes which are one-piece steel forgings or castings, require hardening on the rail faces so that they will be able to withstand the abrasive effect of contact with the idler wheels. To perform this hardening operation, the shoes are passed through a pusher-type, gas-fired furnace where a temperature of 1480 degrees is maintained. As the shoes emerge from the furnace they slide down an apron to a conveyor which carries them through a shallow water bath, shown in Fig. 7. The water level is maintained so that only ½ inch of the shoe is immersed, hardening the rails and leaving the upper part of the shoe to cool slowly so that it

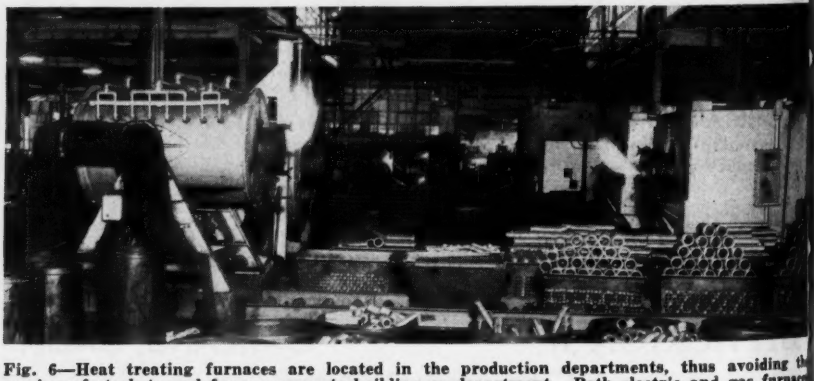


Fig. 6—Heat treating furnaces are located in the production departments, thus avoiding the moving of stock to and from a separate building or department. Both electric and gas furnaces of the most modern type are used.

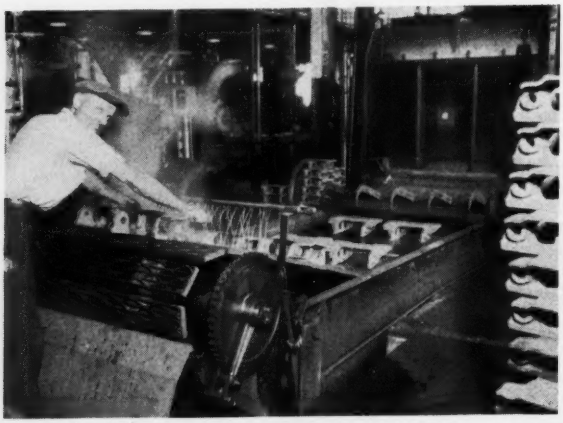


Fig. 7—Track shoes emerging from the pusher-type, gas-fired furnace where the rails of the shoes have been hardened.

can be machined afterward.

At the end of the quenching bath the conveyor passes over a roller, permitting the shoes to slide down an apron to the floor if they are not removed by hand. As the shoes leave the water they are still at approximately 1000 deg. F., which is sufficient to insure a good draw and thus relieve the piece of any quenching strains. After the heat treating is completed, the shoes pass on to the next operations where they are drilled and reamed, finishing at the point of assembly.

The illustration Fig. 8 shows the lower end of the gear department, where the gears and other parts are deposited ready to be placed in baskets and hung on the overhead conveyor to be transported to the final assembly department. As can be seen by reference to the illustration, the conveyor dips down at this point so as to be within easy reach, and then rises again so that the conveyor baskets will avoid interference with passageways or equipment.

In the final assembly department the conveyor passes through the sub-assembly section where the parts are removed as they are needed by assemblers.

(The concluding article of this series will be published in the April issue of this magazine.)

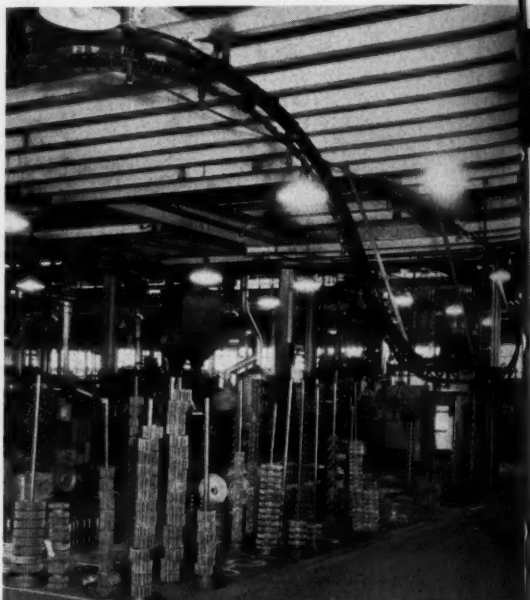


Fig. 8—Gears, shafts, and other parts ready to be placed on the overhead conveyor to be moved to the assembly department in another building.

Testing Hardened Tool Steels At the Fafnir Bearing Plant

By Wm. C. Betz

Equipment Engineer, Fafnir Bearing Company, New Britain, Conn.

AS IT is desired to get the very best service from tools and dies, the question of proper heat treatment and testing is of paramount importance. Knowing just what is required of the tool, selecting the steel best suited for the job on hand, applying the correct heat treatment, and lastly, testing the hardened piece to see that it has been properly heat treated, are all requisites of success.

An accurate determination of the results that have been obtained through the various heat-treatments, must, however, depend to a large extent upon the instruments that have been developed for this purpose. In this article the author deals with the uses of hardness testing instruments and their application in the plant of the Fafnir Bearing Company, New Britain, Connecticut.

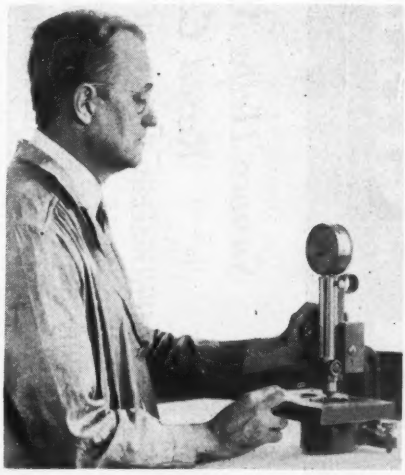
Testing a die part with the Scleroscope.

There are quite a number of hardness testers on the market, but for rapid and practical work on tools and dies they simmer down to about five. Probably the oldest hardness tester is the file, which is used very extensively to try work to see if it is hard; but the exact hardness of a piece cannot be determined by this method. The Shore instruments known as the Scleroscope and Monotron are two very fine instruments for testing work that has been hardened, as are also the Brinell and Rockwell testing instruments.

To test a specimen on the Scleroscope it is held firmly between the base anvil and the upper movable anvil which is operated with a short lever through a pinion and rack. The hardness is determined on the bull type instrument by a small weighted hammer in which a small cone pointed diamond is mounted. When the bulb is squeezed it releases the hammer from its retaining hooks, allowing it to fall on the work and bound up in the tube. This tube is graduated from 0 to 140 and the high point of the bound is located by the eye. A properly hardened piece of carbon water-hardening tool steel or a piece of manganese oil hardening steel should register from 93 to 10 before drawing; high speed ste

should read from 90 to 95 on the scale.

In the dial type of instrument the clamping is the same as above but the hammer release is operated by a small knurled knob which, when turned down until it stops, releases the weighted hammer as in the bulb type. This hammer, however, is much heavier and longer than the one on the bulb machine and though it rebounds as it reaches its highest point it is arrested by a clever arrangement that carries three small balls to form a clutch in the tube that is operated by the hand trip knob. It carries the hammer up with it, and in so doing, the top of the hammer makes contact with the dial operating rack and the "up" position of the plunger thus registers the hardness of the work on the dial, as a direct reading.



The "dial-type" Scleroscope reads direct.

The Monotron, made by the same company, while appearing complicated, is really very simple to operate. In this machine the specimen is held and the diamond ball impression is made through the use of the lever at the left of the machine. This impression is 9/5000 inch deep and the depth is read on the small lower dial, and while the pressure is maintained, a glance at the upper or large dial registers the amount of pressure in kilograms required to penetrate the work to the required depth of 9/5000 inches.

In the Brinell, Rockwell and Vickers hardness testers, the hardness is determined by definite loads being applied through their mechanisms to the penetrators, while on the Monotron, the reading is determined by a predetermined depth of impression, the load to produce this impression depth being read on the large dial. Monotron impressions may be taken very rapidly and a good operator on small work can make up to six hundred tests an hour.

One of the most popular instruments for testing hardness — and one which is in wide use at the Fafnir plant — is the Rockwell Hardness Tester, which is designed somewhat on the same principle as the Brinell Tester. Instead of a ball, however, a cone-shaped diamond or "Brale" is forced under pressure into the specimen to be tested and the hardness is indicated by the depth of penetration, which is recorded on a dial gauge. Different scales on the dial are used for the different classes of work, the "C" scale being read when hardened work is being tested. For such work, the pressure on the Brale is 150 kilograms, equal to approximately 331 pounds.

In making a test, a definite preliminary pressure is first applied through an anvil screw which forces the plunger of the dial gauge up until a line tallies with the end of the dial gauge sleeve, then a lever is tripped which operates the mechanism through which the major pressure is applied. When the dial hand comes to rest, the tripping lever is reset or returned for the next test position which carries the hand on the dial around to indicate hard-

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Speeds and Schedules!

Accuracy and Better Finish Secured, Too

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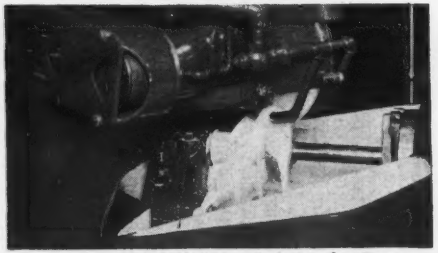
Courtesy Ray Day Piston Co., Detroit

Operation: Rough and finish grooving piston for rings. **Machine:** Sundstrand Automatic Grooving Machine. **Material:** Aluminum. **Speed:** 943 R. P. M. **Size of Groove:** ☆ in. by ☆ in. **Lubricant:** 1 part Sunoco to 50 parts water.



Courtesy Buck & Hickman, Ltd., London. Eng.

Machine: Pratt & Whitney 10 in. Helical Gear Grinder. **Material:** Chrome Nickel Steel. **Wheel Diam.:** 10 in. **S. F. P. M.** 5000. **Stock Removal:** .010 in. **Coolant:** 1 part Sunoco to 40 parts water.

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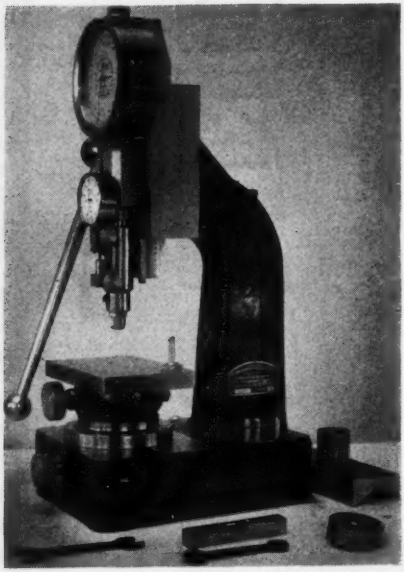
ness. The anvil pressure is then removed and the work may be moved for further tests or removed from the machine. The dial on the new Rockwell tester utilizes a secondary pointer to locate the primary pointer under initial load instead of using a mark on the plunger.

Shore and Rockwell tests are considered indispensable for testing steel with deep hardness features, but for testing for hardness of skin on work that has been aerocased, cyanide hardened, or nitrided, the Fafnir Bearing Company makes use of the "Turner Sclerometer". This instrument consists of a sharp diamond mounted in one end of an arm which is pivoted at the opposite end to an upright. The arm is weighted so that, to test a specimen, the work is slid under the diamond and one pass back and forth is made on the piece, the hardness being determined by comparing the width of the scratch line with that of a tested "comparator". A microscope is, of course, used to make the comparison.



The Monotron, with which a test can be made with one hand and without setting to zero.

The piece tested by this method must be very smooth; in fact, a light grinding cut followed by polishing produces the best results. In testing the deep hardening steels, the surface should be ground in order to obtain the best results as scale and rough surfaces are productive of false readings, although the Monotron is so designed that scale and soft skin can be compensated for to a certain extent.

In making tests with Shore instruments, a steel that has been overheated can be detected by the aid of a file test which is made as follows: If a low reading is obtained after heating and quenching the piece at what is supposed to be the proper hardening temperature, and upon trying to file the piece it is found that the file will not "bite", it is practically certain that the piece has been overheated in the hardening. A properly hardened piece of carbon or manganese tool steel will read from 93 to 100 Scleroscope or from 108 to 117 k.g. on the Monotron.

When using the Rockwell tester, if a reading of over 68 is obtained it indicates plainly that something is wrong. If a specimen that reads over 68 is broken, it will be found that the grain is coarse, and as the hardness reading increases, the grain size will also increase, clearly indicating overheating. High speed steel that has been properly hardened will read about C 63-66 Rockwell, 93-100 Scleroscope, or 98-117 k.g. Monotron, and after drawing will read about C 64-67 Rockwell or 95-102 Scleroscope, after all hardening scale has been removed and the surfaces ground and polished.

Correctly hardened carbon tool steels should read from C 63-67 Rockwell or from 93-102 Shore as quenched

and should be drawn immediately to proper temper. The draw may range from a spring temper of C 45-48 Rockwell to a draw to remove strains only,

Using the Rockwell Hardness Tester.

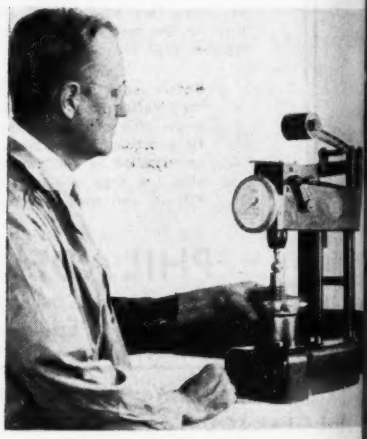
which will not reduce the hardness more than a point or two below the initial hardness. For uniformity of hardness, all drawing should be done to pyrometer readings and the work should be in the drawing furnace long enough for the mass to become thoroughly heated throughout.

If colors are depended upon for tool tempering, there will be a variation of at least two points Rockwell for given colors when drawing is done rapidly. When the draws are long, colors may vary from instrument readings up to 10 points on the Rockwell and 14 on the Scleroscope; thus for long draws, colors are not reliable. A piece of steel that is properly hardened should, upon being tested at practically any point on its surface, produce readings of such uniformity that they will not vary more than three points on the Rockwell C scale nor more than five points on the Scleroscope.

If the readings on a piece of carbon tool steel do not come within the above limitations, one of three things has happened: the piece was not heated uniformly, which may have been caused by allowing it to lie in one position in the furnace while heating; it may have been heated too rapidly and not uniformly, or scale may have formed on it as a result of excessive air blast, which burns the carbon out of the surface and produces soft spots upon quenching.

If the atmosphere is carefully regulated and the work-piece is placed as close to the pyrometer thermocouple as possible, the piece heated slowly and uniformly, and is removed and quenched immediately upon reaching the desired temperature, uniform hardening cannot fail to result. This point has thoroughly been proved in the manufacture of Fafnir bearings.

Due to the intense heat required for hardening high speed steel, this steel should be brought up from its preheat



Testing samples of steel with the Brinell Hardness Testing Instrument.

just as rapidly as possible and should be quenched without undue soaking. The atmosphere in the furnace should be decidedly on the CO side, or rich

gas. The most uniform hardening of high speed steel and the cleanest work is produced when salt baths are used for heating. Work heated in lead is apt to be pitted due to the oxidizing nature of this material at elevated temperatures.

Tools made of carbon steels will give excellent service if drawn to give Rockwell or Scleroscope hardness readings as follows:

	To read Rockwell	To read Scleroscope
Piercing and blanking dies	C59-62	84-90
Piercing punches	C57-59	80-84
Plug, ring and pad gages	C64-67	96-102
Reamers and broaches	C61-63	87-92
Taps	C60-62	85-89
Forming dies	C64-67	96-102
Forming punches	C62-65	89-97
Springs of all kinds	C45-48	57-61
Wood-working gages	C47-52	60-67
Burnishing broaches	C65-67	97-102

In hardening embossing dies and punches, these parts should be at least 65-67 Rockwell or 97-102 Shore and should be drawn for long periods at low temperatures—at least 10 hours per square inch of cross-section and not over 270 deg. F. The work should be allowed to cool in the heating medium if possible; if not, it should be buried deep in Sil-O-Cel or fine coal ashes until cold.

As a general rule, high speed and super-high speed steels are drawn to readings of from 63 to 67 Rockwell or 92 to 102 Scleroscope. As such steels are used almost exclusively for cutting at high speeds, they give the best results at the hardnesses mentioned. A piece of high speed steel will give much better service if drawn 1½ hours at a temperature of 1050 deg. F. than if drawn an hour at a temperature of 1100 deg. F.

We have found that high speed steels that have been heated to 2250 deg. F. in a non-decarburizing salt bath and quenched will show higher hardness readings and perform better than steel that has been heated to 2350 in a muffle-type furnace, the drawing temperatures and length of draw being alike in both instances.

Super-high speed steels, while having longer wearing qualities, will not show higher hardness readings than 18-4-1 high speed steel although they must be heated to higher temperatures for hardening.

Machine Tool Exposition to be Held in Cleveland in September

The Machine Tool Exposition to be held at the Public Auditorium in Cleveland, Ohio, from September 10 to 21 inclusive, 1935, will be by far the largest exhibition of machine tools and accessory equipment ever held in the United States, according to the secretary of the National Machine Tool Builders' Association.

Applications for space, it is said, require a total exhibit area more than 50 per cent greater than the total space occupied by all companies exhibiting in the previous Machine Tool Exposition which was held in the autumn of 193[illegible]. A total gross floor space of approximately 250,000 square feet will be occupied by the 1935 show, it is estimated by the association.

Space originally laid out for the 193[illegible] Exposition was found adequate only for the needs of the member companies of the Association, consequently all available space in the Cleveland Public Auditorium has been leased to accommodate companies in the accessory field. It is believed by the association, on the basis of applications already received from accessory companies and further applications anticipated, that all available exposition space will have been exhausted months in advance of the actual opening of the exposition.

A complete list of companies leasing exhibit space in the exposition will be announced through these columns in the near future.

Don't Abuse the Chuck!

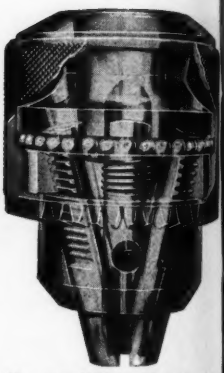


Fig. 1. — A modern light-duty key-type chuck for sensitive, high speed drilling.

By

Philip Winter

Fig. 2.—"Phantom View" of Heavy Duty Ball Bearing Key Chuck

In order that the fullest advantages of carbide cutting tools may be realized, the designer of the modern machine tool is faced with the necessity of providing for constantly increasing requirements of power. Columns are of sturdier design; spindles are of better steel; gears are of better materials and of heavier design, and the strength of the machine is increased throughout—all of which increases the responsibility of the chuck. In the last analysis, high speeds and heavy feeds can only be used if the chuck is capable of "standing the gaff". A machine may be the product of a vast amount of study and work by high priced designers, yet, in operation, it is no better than its chuck.

The modern drill chuck is a simple, yet powerful and accurate mechanism. If it is handled with a reasonable amount of intelligence, its life and usefulness will be as long as the machine upon which it is used. In order to assist chuck users to obtain the highest efficiency and longest life from both the chucks and the machines upon which those chucks are used, a few interesting and useful points are presented here.

The three-jaw drill chuck with the pinion gear wrench or key is standard equipment in machine shops throughout the world. There are three distinct types of key-operated drill chucks available, and in order to obtain the highest efficiency from the equipment, each chuck should be used only for the particular class of work for which it is destined.

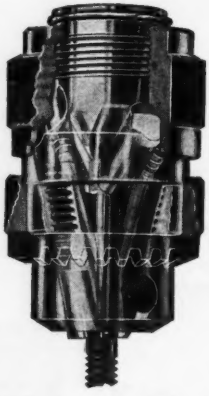


Fig. 3. — Illustration showing design of special tap-holding chuck. This chuck has two sets of jaws; one set centers the tap by the cylindrical part of the shank, the other set drives the tap by the square.

The illustration Fig. 1 shows a "light duty" key-type improved chuck which is especially intended for use on light, sensitive, high speed drilling machines. In order that the chuck may be used to drive small drills at high speeds without vibration, extreme care is taken by

the manufacturer to see that this chuck is perfectly balanced. However, the chuck should not be used for any except light, sensitive drilling. If

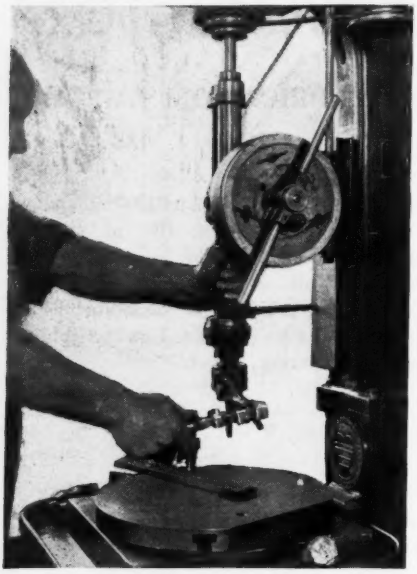


Fig. 4.—Using a wrench to tighten the jaws will result in damage to other parts of the chuck and may ruin it beyond repair.

used on a low speed or general purpose machine, the chuck will be overloaded and will wear out prematurely.

The so-called "medium duty" drill chuck is intended for use on general utility drilling machines such as the tool room press, portable drills, and so on. This chuck has more gripping power than the light duty chuck referred to in the previous paragraph, and is of a more rugged design. However, although it is generally too heavy for the high speed spindle, it is not intended for extremely heavy duty use.

The chuck shown in Fig. 2 is a "heavy duty" ball bearing type key chuck, designed for use on the larger power feed drilling machines, radial drills, and lathes. This chuck has sufficient gripping power to drive drills under the severest of conditions and at the same time is extremely accurate. Friction is eliminated by the use of ball bearings, thus making much greater gripping power possible. The chuck is designed for maximum strength and long life, all parts being carefully heat treated and ground.

A chuck especially designed for holding taps is illustrated in Fig. 3. The primary essentials for tap holding are light weight and a positive drive—both of which are features of this chuck. The tap chuck has two sets of jaws; one set grips the square of the tap shank, providing a positive drive, while the other set holds the shank of the tap absolutely concentric. It should be pointed out in this connection that the ordinary drill chuck can not be used effectively for tapping for the reasons that the light weight type of chuck, which is easily reversed, is of too light construction for the job while the heavy duty type of drill chuck is difficult to reverse quickly, due to its weight, and its use

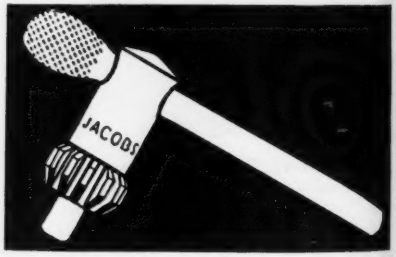


Fig. 5.—The latest type of chuck keys, such as the one shown here, are designed to provide the correct amount of leverage for tightening the chuck.

will result in undue wear on the tapping machine or attachment.

In using drill chucks of the key-

type it is most important, aside from taking care to use the proper size for the job in hand, not to allow the chuck to slip on the drill. The chuck jaws must be carefully tightened with the key. Repeated carelessness in tightening will allow the drill to slip in the chuck in the jaws, allowing the chuck to revolve while the drill is stationary and eventually wearing away the gripping surface of the jaws. Thus the gripping power of the chuck will be impaired and it will no longer hold, even when properly tightened. Worn jaws in chucks should be replaced. Jaws may be purchased and assembled to the chuck by a good mechanic, or the chuck may be sent back to the factory to have this done.

Any attempt to make worn chuck-jaws hold by tightening them more than can be done with the key supplied, such as, for instance, by using a monkey wrench on the key as shown in Fig. 4, will damage other parts of the chuck so that it will be impossible to repair the chuck satisfactorily. The latest type of chuck key, shown in Fig. 5, is carefully designed to fit the hand and will provide exactly the right amount of leverage for tightening the chuck.

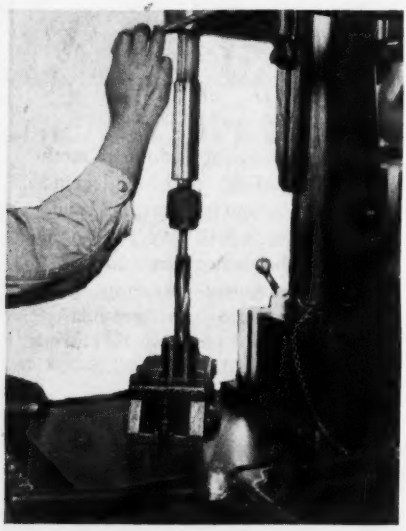


Fig. 6.—Overloading the chuck by using a large drill with a turned-down shank has the same damaging effect on the jaws that is produced when a wrench is used on the key.

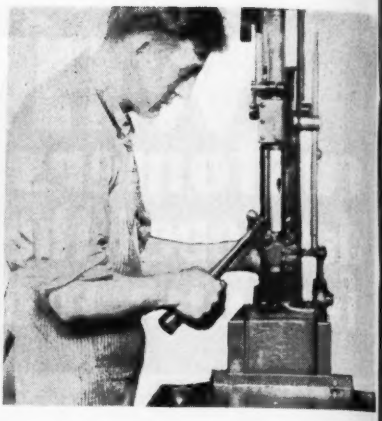


Fig. 7.—No intelligent mechanic will ever pound a fine drill chuck with a steel hammer. This operator should be using a drift.

Overloading the chuck as shown in Fig. 6 is very bad practice, but one which is encountered occasionally. Here an operator is shown using a 1-inch drill in a light drilling machine, the shank of the drill having been turned down so that he could get it into a ½-inch chuck. The result is that the resistance to the large drill is out of proportion to the gripping area of the shank and the chance is great that the drill will catch and stick in the work while the spindle and chuck continues to revolve. When this happens it does not take very long to completely ruin the jaws of the chuck.

The sizes determined for the shanks of drills are the result of many years of experience and study of this particular problem, and are intended to be sufficient to withstand normal drilling

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procedure. Large drills should be used only in large machines and, of course, with the proper chucks.

Although key-type chucks are of

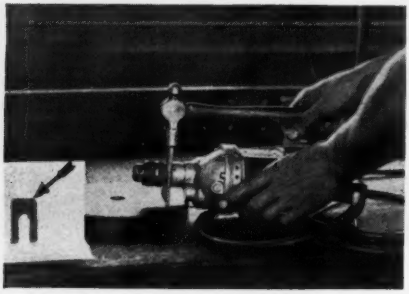


Fig. 8.—Tapered-shank chucks should be removed from the spindles by using wedges similar to that indicated by the arrow, inserting the wedge between the chuck and a shoulder on the spindle, as this operator is doing.

rugged construction, their accuracy will in time be securely impaired if they are removed from the drill press spindles by pounding them with a hammer, as illustrated in Fig. 7. There are two methods of connecting chucks to portable drill spindles. One type is made to fit directly to a spindle with a tapered end, and the other type of chuck is fastened to the spindle by means of a thread. The tapered chuck may be removed from the spindle by inserting a pair of wedges or a single U-shaped wedge between the rear end of the chuck and a shoulder on the machine spindle and then striking the wedge with a hammer as illustrated in Fig. 8.

These wedges may be obtained from dealers who stock drill chucks, or they can be obtained from the chuck manufacturer direct. A threaded chuck may be removed from the spindle by inserting a key or pin in the chuck and striking the key a blow in a counterclockwise direction—looking at the front of the chuck. If the chuck is not readily removed, then the operator should disassemble the front of the drill gear case, remove the chuck and spindle, then hold the spindle in a vise between two wood or brass blocks and proceed as above. Care should be taken not to mar the spindle.

Parts for all key type chucks can be obtained from mill supply dealers and may be installed by anyone having access to an arbor press. No one should attempt, however, to disassemble a chuck without being properly instructed. Instructions can be obtained from the dealer or from the chuck manufacturer. Incidentally, the chuck manufacturers all maintain repair departments and when there is any doubt regarding the method of repairing, it is advisable to take advantage of the expert service rendered by the manufacturer.

When mounting a tapered chuck on

Fig. 9.—Pounding on the ends of the chuck jaws may result in a broken thread on one or more of the jaws, and in any event will impair the accuracy of the chuck.

either an arbor or a machine spindle it is essential that both the taper

hole in the chuck and the tapered spindle be absolutely clean and free from grease. With the chuck open to its maximum capacity so that the jaws will be inside the body, the chuck can be lightly tapped into place in the spindle. Striking the chuck on the jaws, as shown in Fig. 9, will probably break the thread of the jaw or in any event will impair the accuracy of the chuck.

A threaded chuck should be mounted on a clean spindle. If a small amount of clean oil is applied to the thread before the chuck is mounted, rust will be prevented and the chuck will be easier to remove when removal is necessary. It is not necessary to tighten the chuck on the spindle; this tightening will be done automatically when the drilling operation is started.

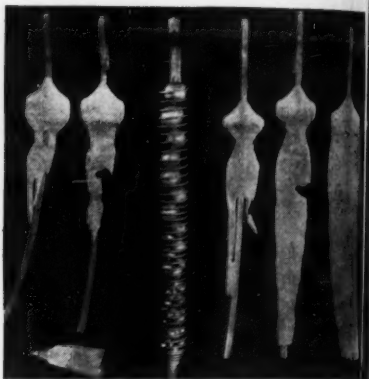
(Illustrations courtesy Jacobs Manufacturing Company.)

Ball Anode Eliminates Losses

BY using anodes for electro-plating in the shape of a sphere instead of a slab, as has been the custom heretofore, the modern electro-plater is enabled to save a great deal of expensive material that formerly was wasted. The illustration shows a ball anode in the same cadmium bath with several slab anodes in various stages of disintegration. As the slab anodes corrode in the plating process, the area of each slab decreases, thus disturbing the metal content of the bath. As the corrosion proceeds, pieces of the cadmium fall from the straps to the bottom of the tank where they are useless as anode material.

The pure cadmium balls corrode evenly in the helical coil and as the diameter of each ball diminishes, the ball descends in the wire container, leaving room for new balls to be added at the top. Even the smallest scraps of metal are used up completely when they are suspended in the helical containers, eliminating all waste of metal due to scrap losses. The convenience of dropping a ball into the top of a container at intervals makes it easy for the operators to maintain the metal content of a plating bath constant, without the necessity of expensive salt additions.

Ball anodes were first introduced to the plating several years ago by The



Ball anode and slab anodes in a cadmium plating bath. As the balls corrode in the plating process, they drop down in the container and new balls are added at the top.

Udylite Company, 1651 East Grand Blvd., Detroit, Michigan, as a part of the Udylite process of cadmium plating. The popularity of this type of anode has spread from cadmium plating to include other electro-plating processes involving copper, zinc, and so on. The Udylite Company has exclusive rights to manufacture, sell and use ball anodes for electric-plating.

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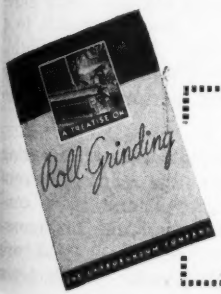

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Punch Press Operations and Tools, VI

The uses and advantages of the sizing-die are explained in this article, and several typical designs of sizing dies are described and illustrated.

By C. L. Szalanczy
Die Designer, Westinghouse Elec. & Mfg. Co.

IN THE production of stamped metal parts it sometimes becomes necessary to use punch press tools designated as "sizing dies", both for the purpose of increasing the accuracy of the bends, and to set the metal back to its final position as indicated on the drawing of the finished part.

On such soft metals as copper, soft brass and annealed cold rolled steel a sizing operation is rarely required, since the bender can usually produce the part within the limit of accuracy specified on the drawing. This is due to the fact that these metals have little or no spring in them; when they are once bent, they usually remain in the bent position.

On work that is being produced from unannealed steel, hard brass, or phosphor bronze, a sizing operation is usually necessary. As was explained in the fourth article of this series (January, 1935), when parts made from these metals are released from the bender they exhibit a tendency to revert to their original shape, commonly known as "spring back". This "spring back" cannot be eliminated in the bending or forming tools, even by grinding the bender punch back past the 90-degree angle.

Another motive for sizing the blank is that, when bending the metal, the punch making the bend must have a radius ground on the edge over which the bend is being made, otherwise the punch might shear the blank instead of bending it. Now, if the blank is of such nature that a sharp corner or very small radius is required at the bend, it can readily be seen that some means aside from the original bender must be depended upon to produce this result. For these reasons the sizing die is used, the sizing operation being the final forming operation.

The sizing die, no matter what type, should by all means be placed into a die set that is equipped with liner or guide pins as they assure a quick and accurate setting of the die in the punch press and also guide the punch so that it will maintain perfect alignment with the die. Accurate setting and perfect alignment at all times is absolutely necessary in a die of this type in order to obtain the desired result on the finished blanks. Any sidewise movement of the punch due to a loose-fitting ram, however slight, would make the blanks unfit for use and might cause serious damage to the sizing die.

The demands of the engineering department upon the shop are constantly growing. There is a constantly-increasing demand for press-fabricated parts of types that are difficult to produce with punch press

tools. In order to meet competition, the designers must cut the building cost of their product and at the same time keep that product at a state of perfection which will enable it to perform for a long period of time without giving trouble.

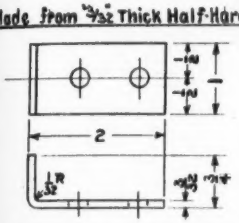

Fig. 1.—Drawing of simple type L-bent blank.

Sometimes this can be accomplished by redesigning parts of the apparatus in question so as to do away with costly castings and their patterns and using stampings instead. In many cases the press-made parts will answer the purpose just as well and will present opportunities for savings to both the producer and the buyer. The foregoing comprises some of the reasons why sizing dies are receiving more consideration than ever before.

Occasionally a case is found where a bent blank cannot be improved by the use of a sizing die. The reader must not think that a sizing die can be used to correct faulty bender design or construction and thus produce a perfect piece from one that has been badly formed. There are some types of stampings to which a sizing operation should not be applied. Consequently a careful study should be made by the designer when he is laying out a bending die to determine just how the die is to be constructed, whether or not a sizing die is required, and, if made, whether or not it will correct the blank as it comes from the bender.

In the event that a sizing die is advisable, it should be made so that the punch will cover the work and the setting blow will come directly on that part of the blank that is to be sized, while applying no more than a steady pressure to the parts that have been correctly formed.

There are several types of sizing dies. The single type, the double type, and the mandrel type are used for sizing blanks. The type of tool that is to be used usually depends upon the design of the blank itself.

The design of a simple L-bent blank is illustrated in Fig. 1. It may be assumed that this blank was made on a piercing and severing die, and bent to shape in a regular L-type bender. The blank in this case is made of 3/32-inch thick half-hard strip brass. Due to the permissible variation in the thick-

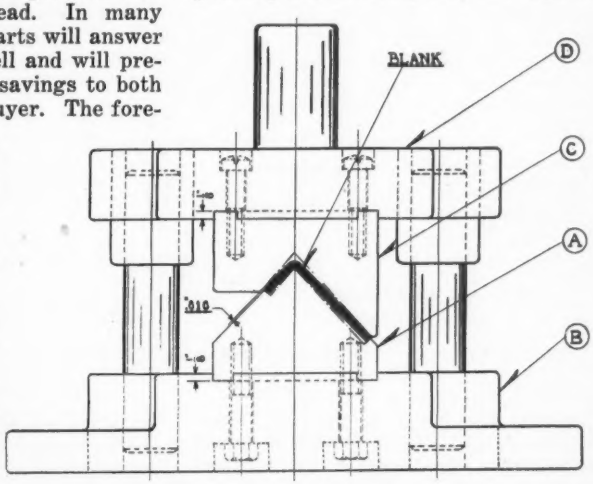

Fig. 2.—Drawing showing design of sizing die required to size the blank illustrated in Fig. 1.

ness of the blank material, and again to the fact that the hard material would fracture and break if it were subjected to such a strain, the 1/32-inch radius required in the corner cannot be formed in the bending operation and thus the dimensions of the finished blank from the bend to the two ends cannot be obtained in the bender.

In consequence of this fact, the bender is made to produce a blank with the smallest radius that will not break and the blank is then formed to its final shape in a sizing operation. The sizing die reduces the bend to a 1/32-inch radius and corrects the dimensions from the radius to the two outer ends.

The drawing Fig. 2 illustrates the design of the sizing die used to perform the final operation on the L-bent blank shown in Fig. 1. The die consists of but two parts; the sizing block, which is the lower or die part, and the sizing punch, which is the upper piece. The sizing block A is mounted on the die shoe B, where it is anchored in place by two hexagon machine bolts. The block can either be doweled or set into the die shoe to prevent movement. The block A should be made of tool steel, hardened to give it a hard surface and then drawn to leave a tough inner core.

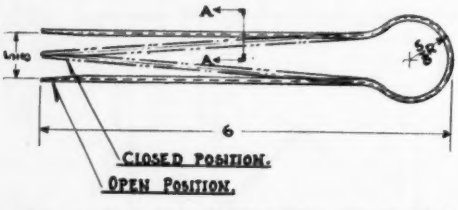

Fig. 3.—Drawing of loading pliers used to place blanks in the benders and sizing dies.

The work should be placed on the sizing block with the aid of special loading pliers made of phosphor bronze or spring steel and shaped to the design shown in the drawing Fig. 3. Pliers of this or a similar type should always be used to locate work in bending dies and sizing dies, especially if the blanks are small, so as to aid in keeping the operator's hands from under the punch and thus help to eliminate injuries.

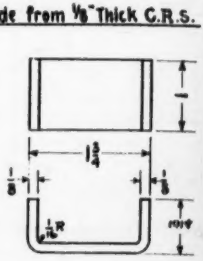

Fig. 4.—Drawing of a "U-bent" blank.

The reader's attention is called to the two shoulders machined on the die block Fig. 2, at the point where the piece rests on the sizing die. The shoulders support the blank and also gauge the final position of the bent piece. Since the blank material is, in this case, 3/32 inch thick, the shoulders should be made about 0.005 to 0.10 inch less than 3/32 inch so that the sizing punch will not strike them; thus all the force of the ram is delivered to the material. It has been found that if these shoulders are omitted, the blanks are usually elongated by the sizing operation.

The sizing punch C, Fig. 2, is also made of tool steel, hardened and drawn in the same manner as the die part, and it may either be set into the upper shoe or doweled. The punch is anchored to the shoe with two filister

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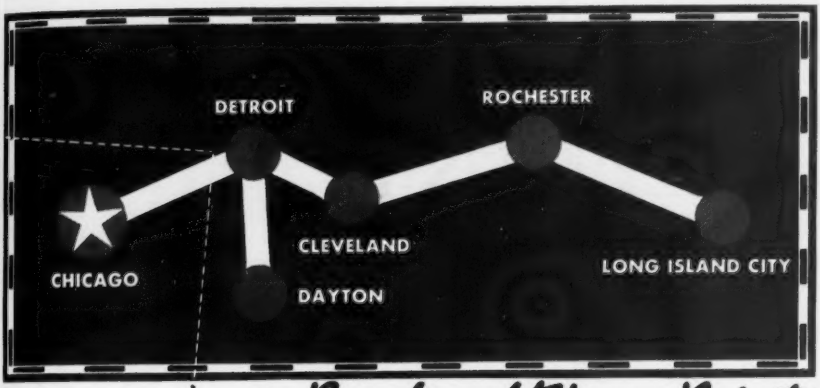

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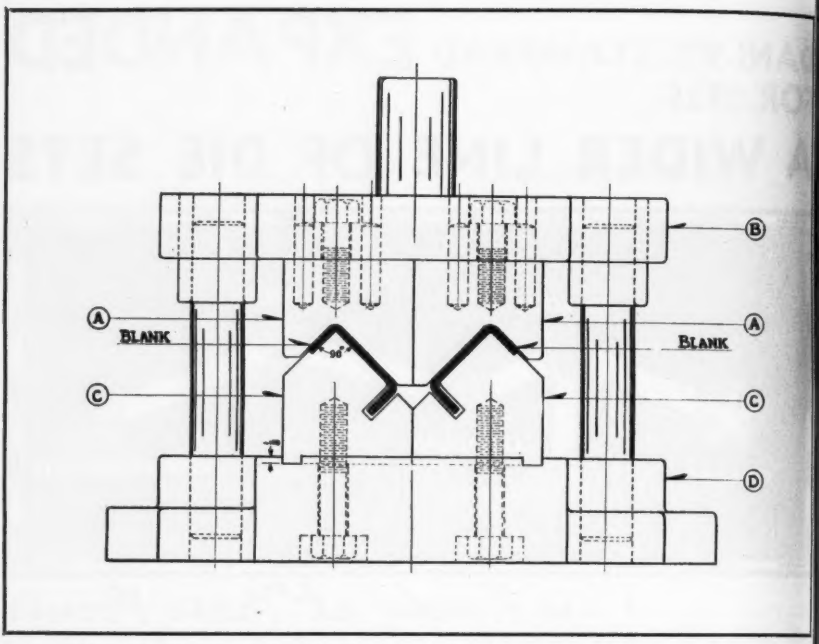


Fig. 5.—Design of double sizing die used to finish the blank shown in Fig. 4.

head screws, as can be seen by reference to the illustration.

In building a sizing die, it is usual practice to machine the blocks that constitute the punch and die parts to approximate dimensions and then try the die out while it is in the soft stage. The fact that the extent to which the material will "spring" cannot be anticipated makes it impossible to finish the die to given dimensions. Upon trial, if the die does not impart the required shape to the blank, the angle is changed by machining some of the metal away, as shown by the dot and dash lines in Fig. 2 and the operation is repeated. Usually two or three trials are necessary before a sizing die is completed.

Figure 4 shows the shape and dimensions of a U-bent piece that is made from ⅛-inch thick cold drawn steel and bent to shape in a U-type bender. As produced by the bending die, the 90-degree angle and 1/16-inch radius are inaccurately formed.

The drawing Fig. 5 shows the general design of the double-place sizing tool used to size the blank illustrated in Fig. 4. The punches A and the dies C are made separately, for several reasons which will be explained in the description of the mandrel-type tool farther on in the article.

It should be noted that in this tool the blank lies approximately 45 degrees on each side of the bend; thus the pressure on both sides of the bend is equal, which produces the best results in sizing. A slot is machined in the die part C to allow the blank to fit down inside the block. Clearance must be allowed in the slot for the blank. The shoulder on the die block is made

about 0.010 inch less in height than the thickness of the blank material. The punch holder B and the lower shoe D are standard die set parts.

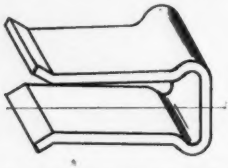


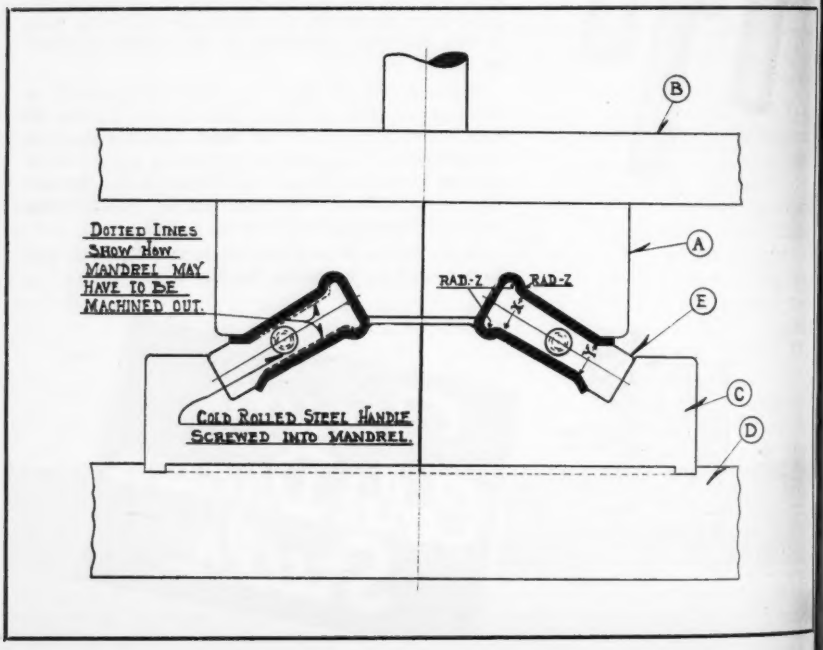
Fig. 6.—Drawing of a switch-jaw.

Figure 6 is a drawing of a single-unit switch jaw, to be made from ⅛-inch thick phosphor bronze. The piece is formed approximately to shape in a two-position bender, but, due to the spring in the material, the opening dimensions and radii are inaccurate as the piece comes from the die. This condition must be corrected and the part must be finished to the correct shape and size in a sizing operation.

As a formed blank of such design is much more difficult to size than the blanks previously discussed, the tool designer must change the construction of his sizing die somewhat in order to obtain the desired result. From past experience he knows that, to do the job correctly, the sizing die must be made with two recesses, as shown in Fig. 7, so that both sides of the piece may be sized by a direct blow of the punch. The angle on the punch and die are changed so that a more direct blow is delivered to the blank. In addition, two removable mandrels are used to hold the blank and enable the press operator to move the blanks from one sizing position to the other.

The drawing Fig. 7 illustrates the type of sizing die that is best adapted

Fig. 7—Mandrel-type sizing die used to correct the shape of the switch-jaw illustrated in Fig. 6.



to size the blank described above. The two punches A, which are of tool steel, are set side by side on the punch holder B. These punches are machined to a shape that will form the blanks nearest to the correct shape and size. Due to the inability of the tool designer to correctly estimate the amount of spring in the material, it is impossible for the designer to supply the dimensions and so they must be worked out by the diemaker during the development stage, while the die, punch, and mandrel are in the soft state.

The punches are held to the top shoe by filister head machine screws and dowels. By making both the punches and the dies in separate pieces, the die maker has an opportunity to save time and labor when it is necessary to machine out some of the metal in order to obtain the correct contour on the punch and die. If either the punch or the die were made in one piece, the entire contour of the tool would have to be recut for each change and this might mean that in obstinate cases where three or four changes have to be made, so much of the metal is removed that the blocks cannot be used and they must be discarded for new ones.

The die C, or anvil part of the siz- ing tool, is made of tool steel and i machined in the same manner as th punches. It must be of rugged de- sign in order to withstand the pound- ing to which it is subjected in serv- ice, and should be set into the di shoe to an approximate depth of ¼ inch, although in some shops thes punches are doweled to the tops o the shoes. It is best to set the di into a recess in the shoe, but in cas it is doweled, the dowels should b not less than ⅜ inch diameter an hardened so as to eliminate any chance of them being sheared off.

The mandrels E are also made o tool steel, finished to the require shape. The mandrels are placed be- tween the punch and die in such manner that they are supported by the die block C. Each mandrel must be shaped to suit the blank, and when finished, may look as indicated by the dotted lines.

When the sizing die has been re worked to such a point that it will produce blanks within the require limits of accuracy, it is hardened t 80-85 point Scleroscope, polished o the locating and sizing surfaces, an assembled to the die set.

DRAW-CUT MACHINE TOOLS BY MORTON: This twelve-page 8½x11 inch booklet comprises an exposition of the many types and sizes of draw-cut machine tools made by the Morton Manufacturing Company, Muskegon Heights, Mich. Included in this catalog are high duty draw-cut shapers, draw-cut shapers for structural steel work, Morton high duty draw-cut single purpose shapers, Morton roll wabble shapers and planers, Morton horizontal boring, drilling, milling machine and draw-cut traveling head planers, Morton draw-cut portable keyway cutters, draw-cut stationery keyway cutters, slotting machines and high duty draw-cut flash trimming machines.

The book presents the advantages of the draw-cut method of design and tells why these machines are so generally known and used in large plants such as railway shops, shipbuilding plants, and so on. Copies free upon reques

VAN NORMAN MACHINE TOOL EQUIP- MENT: Operating executives of too rooms, metal pattern shops, and simil departments or shops where a need exis for a machine in which rigidity an strength are combined with adaptabilit precision, and flexibility, will be inte ested in the new catalog now being i sued by the Van Norman Machine Too Company, Springfield, Mass.

In this catalog are described and illu trated the various types and sizes o Van Norman millers, complete specifica tions for each machine being included The latter part of the book is devoted t pictures and descriptions of these mille in use in various tool and pattern shop the whole forming a compendium of va uable information for the executive o such a shop. This book is free to me chanical executives.

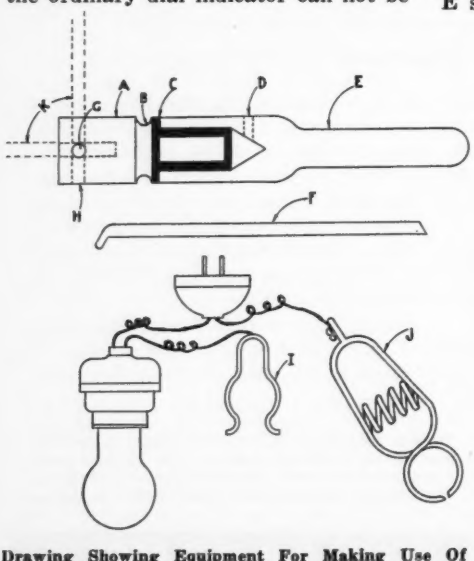
IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

Electric Light Used As Indicator

By Jos. R. Cowles

IT sometimes becomes necessary to check the accuracy of an internal dimension which is so inaccessible that the ordinary dial indicator can not be used. As an example of such a case, let us assume that it becomes necessary to rechuck a piece of work which must run true at both ends. It would be possible to true up the front end of the work so that it will run true although the rear end might not be chucked central. The illustration shows a tool which has been used by the writer for many years for testing the concentricity of deep holes, internal surface of collet adaptors, and other internal surfaces that are difficult to get at.



Drawing Showing Equipment For Making Use Of An Electric Light to Test Inaccessible Dimensions

The tool is made from a section of ⅝ inch cold rolled steel approximately 4½ inches long, turned as shown at **E** so that it can be held in a boring head or chuck. Into the large end of this piece is bored a hole to receive a fibre bushing **C**, into which is pressed the shank of the part **A**. Thus while combined as one tool, the two parts **A** and **E** are insulated from each other. A small vent hole is drilled as indicated at **D**. The part **A** is turned with a radius forming tool as indicated at **B** and two $\frac{1}{16}$-inch holes are drilled in the end of this part, one straight into the center hole in the end and the other cross-wise of the piece as shown at **H**. A ¼-inch hollow set screw is located in the piece at **G**.

The part **F** is a length of $\frac{1}{16}$ inch cold rolled steel, made to any length and shape to suit conditions, and intended to be a sliding fit in the two holes in the piece **A**. This piece can be located in the end and bent according to the diameter of the hole, or it can be located cross-wise in the hole and locked in position by means of the screw **G**. The remainder of the equipment consists of an electric light socket and bulb, one of the wires from the socket being attached to one

post of the plug, as shown, and the other wire being attached to the spring clip I. To the other post in the plug is attached a wire which is also attached to the battery clip J.

To use this equipment, the holder E is located in position with the part F set as required by the work. The plug is applied to a light socket or other convenient outlet, the battery clip J is clipped onto some handy part of the machine in which the operation is being performed, and the spring clip I is slipped over the groove B. It is obvious that all that is necessary now to complete the circuit and light the lamp is for the end of the piece F to touch the machine or work.

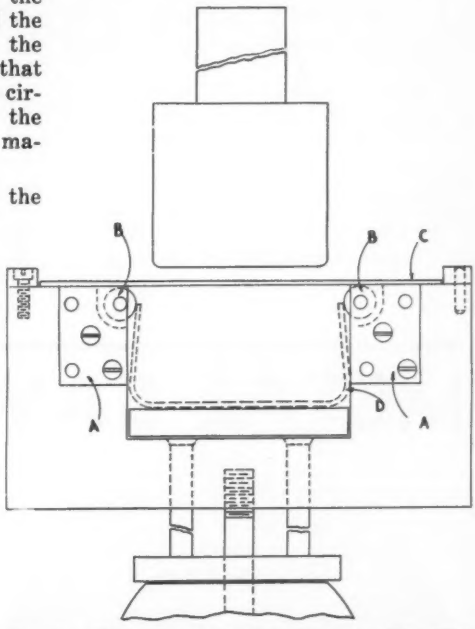
The relation of the spindle to the work can now be adjusted so that contact is made and by rotating the tool, if a vertical machine is used, or the work, if a lathe is used, it is a simple matter to tell whether the end of the contact point F is touching at all points. A 10-watt bulb is best for this purpose.

Using Rollers In Bending Dies

By Charles Kugler

DIE makers are frequently faced with the task of experimenting, when building a forming die, to determine the amount of "spring-back" of the metal that must be allowed for in the construction of the die. There is no rule that will cover this point, as different kinds and thicknesses of metal vary in the extent to which they will spring; consequently the trial and error method is generally used. This means that the forming blocks or dies must be made to varying sizes until the correct size for the job in hand is determined.

The large manufacturing plant with which the writer is connected has succeeded in eliminating a large part of this grief by equipping forming dies with rollers, as shown in the illustration. When a die is built to incorporate the use of rollers, as shown, it is a simple matter to increase the diameter of the rollers and



Drawing Illustrating Method of Equipping Dies With Rollers To Facilitate Adjustment For Spring Of Metal

decrease the width of the punch, as required, until the correct size is found. The results obtained by the use of the rollers were so satisfactory that all dies of this kind are now equipped with rollers.

The usual construction is similar to that shown in the drawing. To the die are attached four plates, A, which support the rollers B. The plates

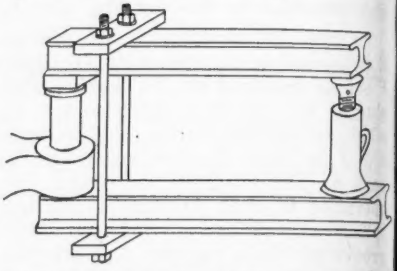
should be as heavy as possible and should be hardened, and the rollers should be made as large as possible and should be hardened and ground. At C in the illustration is shown a work piece in position for forming, the finished piece being indicated by the dotted line D. The method shown is both simple and highly efficient.

Improvised Powerful Press

By Charles H. Willey

THE machinist whose task requires him to do all sorts of repair jobs in difficult places under all kinds of conditions is frequently called upon to exercise a considerable amount of ingenuity in order to produce results where regular shop equipment is not available. Such a job was encountered in the renewing of a crank pin in the drag crank of a mill engine. The new pin was made at the shop, but the work of pressing the pin into place had to be done on the job without the benefit of a power press.

In order to complete the task a press was formed of two sections of



Press Made Of I-Beam Sections, Bolts, Plates, And a Screw-Jack

I-beams, a pair of large, long bolts and heavy plates, and a screw-jack, as shown in the drawing. The plates were bolted together over the ends of the I-beam sections, then the sections were adjusted over the work at one end and the screw-jack was placed

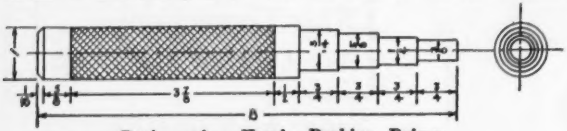
between them at the other end. By revolving the screw-jack in the usual manner, the ends of the I-beams were spread apart at the screw-jack end and correspondingly forced together at the other end, forcing the pin into place.

The idea is very simple, but there are places where it would be very valuable.

A Handy Bushing Driver

By C. F. Fitz

HOW often, when a small bearing or bushing is to be removed from a machine, does the mechanic spend time searching for a small piece of metal that can be used to drive the bushing out of its hole. The bushing driver shown in the drawing takes a little time to make, it is true, but it is of extremely simple design and to the bench or floor mechanic, it has a value out of all proportion to its cost.



Design of a Handy Bushing Driver

The driver should be made of tool steel and hardened, if it is to be used more or less constantly, and can be used either with an arbor press or with a hand hammer. The simplest tools are often the most useful ones.

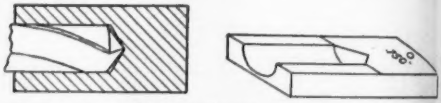
Improvised Drill Gage

By J. E. Moore

THE technical high school in which I serve as an instructor lacks a grinding machine especially designed for the grinding of drills, consequently the boys have to grind their drills "free hand" at the regular tool grinder. In order to produce a point that would be somewhere near accurate, the boys up until quite recently have been using a gage that was purchased from a tool manufacturing firm. This gage, however, only aided in grinding the lips at the same angle and to the same length; it could not be used to gauge the clearance back of the cutting edge. And to a beginner, this matter of clearance is about as "clear as mud".

We still use the conventional gage to obtain the proper lip angle, but to obtain the correct clearance we use a gage of our own design and make. We made up a set of small cast iron blocks—one for each size of drill in our school set. Then, with a brand new drill, we drilled a hole about three inches deep in each block, each block being drilled with a different drill. The drill being factory-ground, the angle left by the point of the drill in the bottom of the hole could not be otherwise than correct.

Each block was then milled away until exactly half of the hole was left, as shown in the illustration. Then the new drill was laid in the half-hole and revolved until the back edge of the lip came even with the surface of the block, and a line was inscribed at the corner of the lip. The line was marked off on both edges, as shown. Thereafter, when grinding drills, the clearance was ground back until the rear point of the lip came even with the line. The boys readily understand "clearance" when they see it illustrated by placing a drill in one of the blocks.



Drill gage which indicates the correct amount of clearance.

Mental Gymnastics With Fractions: Discussion

By Ernest H. Peters

A LITTLE further discussion on the article in the January issue of MODERN MACHINE SHOP, by John E. Hyler, commenting on George Laidler's article on "Mental Gymnastics With Fractions". I use a method of halving a mixed quantity which does not entail the use of an improper fraction. A mixed quantity, where the numerator of the fraction is even, is in itself simple to halve. When it is odd, coupled with an odd whole number, I use the following method, taking Mr. Laidler's same $5\frac{7}{16}$ as an example. One-half of 5 is 2. Forget the remainder. Add the numerator and denominator, which gives us 23 as a new numerator. Then simply double the denominator, giving the result 2 23/32.

A more unlikely, but involved fraction, such as 211 9/31 is just as easily calculated. One-half of 211 is 105, always disregarding the remainder. The total of 9 and 31 is 40. Double the denominator, and the result is 105 and 40/62, which reduces easily enough to 105 20/31.

Another short cut in calculation, though not necessarily in fractions, is determining the area of a circle. This method, to my mind, reduces the problem to a minimum of figures over more commonly used rules. The diameter known, the circumference is easily found by D X N, or D X 3 1/7 for approximate figures. The area, then, is ¼ of the diameter, or in other words ½ the radius, times the circumference. The rule, written, is readily remembered as A = C X R/2 or area equals circumference times one-half the radius.

I might mention another one which avoids a catch, without giving the matter more than a first thought.

hing Abrasive

IKE THIS

NOTE how water rolls off the grain on the right. This grain lacks capillarity—it repels glue.

See how the grain on the left absorbs the water—soaking up every drop. This grain has high capillarity. It soaks up glue in the same way—giving a strong, long-lasting, fast-cutting polishing wheel.

High capillarity is a feature of Alundum Abrasive. The Norton manufacturing process assures it. Norton packing methods protect the grain's capillarity. It reaches you unimpaired.

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ding Wheels, Pulpstones • Laboratory Ware; Refractories; Porous Plates
rasive Papers and Cloths • Norton Pike Sharpening Specialties.

The average person, I have found, confronted with two tanks of equal length, one 30 ft. diameter and one 10 ft. diameter, questions the fact that the larger one has a capacity 9 times greater than the smaller one. The same holds good on the area of two circles.

The ratio of the diameter of two circles of different size, squared, will give the relative difference in area (or capacity, if a tank) of the larger circle.

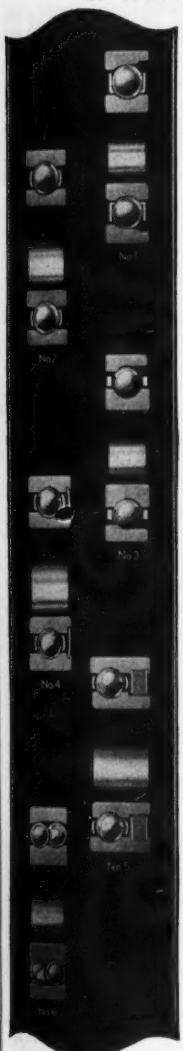
In illustration, a 20 ft. diameter circle is twice as large, in diameter, as a 10 ft. circle. Two, squared, is four, giving the area of the larger circle as 4 times the smaller one.

Consequently, a 30 ft. diameter is 3 times larger (in diameter) than a 10 ft. circle. Three, squared, is nine, giving us a 9 times greater capacity in the larger circle, than the smaller one.

NORTON GRINDING WHEELS For Grinding and Lapping Cemented Carbides: This 16-page book, issued by the Norton Company, Worcester, Mass., describes the structure and construction of Norton Diamond Wheels and gives a clear outline of the results that are obtained when the wheels are used for grinding and lapping cemented carbides. Clear constructions are given for the use of the wheels, with data as to speeds, truing methods, lubrication, dressing, etc. An actual case is cited giving figures as to stock removal, grinding and lapping done by old and new methods, and saving. This book is available to mechanical executives upon request.

GORHAM GROUND TOOL BITS AND TURNING TOOLS: This six-page folder, now being distributed by the Gorham Tool Company, 14400 Woodrow Wilson Ave., Detroit, Mich., contains some very interesting and valuable information regarding the selection and preparation of cutting tool materials for the metal-working field. In addition, it describes the different kinds of ground tool bits and turning tools made by this firm, with tables of sizes and prices. Copies of the folder gratis upon request.

"NORMA-HOFFMANN" PRECISION BEARINGS



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THIS is the objective of every executive, engineer and designer; and the performance of the bearings in a production machine is a vital factor in keeping costs down. * * * * But, in comparing bearings, look beyond first cost—look to the ultimate cost over a period of years. Let proved performance point the way to your decision. * * * * For over 20 years, in every field of industry, Norma-Hoffmann **PRECISION** Bearings have been making distinguished records which command the confidence of those who seek the lower production costs that come with the use of better bearings.

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NO ONE type of bearing is so versatile in its operating characteristics that it will meet all conditions; the conditions should determine the type of bearing used. From the comprehensive **NORMA-HOFFMANN** line — here illustrated in part and briefly indexed — a **PRECISION** Bearing, or several in combination, can be chosen that will be exactly right for the duty. Let our engineers, with their specialized experience, work with you in selecting and applying bearings that will lower your production costs. Write for the Catalog.

1 — Open (separable) type ball bearing.

2—Closed radial type ball bearing.

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4—Single-plate grease-retaining, dirt-excluding ball bearing (available in double-plate type also).

5—"7000" Series "Greaseal" felt-protected ball bearing.

6 — Double-row, self-aligning ball bearing; also furnished with adapter sleeve and nut.

7—Standard cylindrical roller bearing.

8 — One-lipped cylindrical roller bearing.

9 — Two-lipped cylindrical roller bearing.

10—Full type (retaining ring) cylindrical roller bearing.

11—Self-aligning adapter type cylindrical roller-bearing with grease-retaining, dust-and-moisture-excluding side plates.

12—Ball thrust bearing.

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Over the Editor's Desk

Advertising

AS we go to press, this issue of MODERN MACHINE SHOP carries the advertisements of 152 manufacturers of machine tools, small tools, cutters, gears, machine accessories, attachments, materials, and other products with which the metal manufacturer or machine shop owner is enabled to increase the quality of his product, reduce his cost to his customers, or give better service on deliveries.

Advertising has attained an amazing magnitude as a business force. Intangible, valuable only to the extent to which it interests its readers, advertising exerts an influence on young and old, on rich and poor, which places it in the front rank as a spur to progress. Advertising serves in the dual role of salesman and educator. The primary object of an advertisement is, of course, to acquaint the public with a source of supply for the product made by the advertiser, but to a large extent it also functions as a source of information regarding developments in the field to which it belongs.

What a world this would be were all advertising to suddenly be suspended. A manufacturer could develop a new appliance, an inventor could produce an immensely valuable machine, new materials could be discovered—all sorts of things could be invented that would make life easier or happier—and the world, practically speaking, would never know it. The business of the world would be so shocked as to be inanimate for a period, although the shock would not be permanent. In a short time commerce and industry would take up where it had left off, but progress would be slow, as it was before the magazine and the newspaper were available to everyone.

Inventors and scientists are constantly making discoveries of vast potential value, but that value can only be realized if a quick, efficient means is available for placing the news of the development before those who are likely to be interested in it. Without such means, very few of these discoveries and developments would ever see the light of day. Manufacturing on an economical basis would be practically out of the question, due to the lack of a market for wares of which logical buyers were ignorant. It is only possible to manufacture on a large scale when there is a market ready to take the product, and a market can only be created on anything like a large scale when the logical buyers of that product can be reached with the story of its development quickly and often.

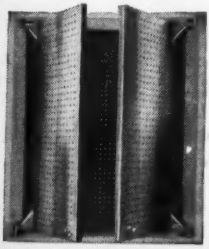
How much of its education the world owes to advertising regarding all kinds of things that have to do with every-day conditions of living is something that cannot be estimated. In presenting his wares to the public through the printed advertisement, the advertiser makes possible a constant comparison between the commodities of yesterday and those of today. In describing his product and telling why it has certain advantages over the products that have been available previously, the advertiser is adding to the education of those who read his advertisement. He is telling the story of a modern development—presumably an improvement over the tools or materials or accessories that have served the same purposes heretofore—and every improvement in our facilities for living, however small, is a contribution to the advancement of civilization.

ORDERLY *and* ACCESSIBLE

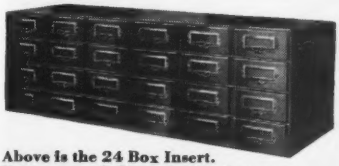
First Principles of Tool Room Economy

● Industry carries a tremendous investment in tools. Vast savings are possible through the principles on which Lyon Steel Tool Room Equipment is designed. Only two of the many special tool room storage units are shown here. Lyon representatives stand ready to make suggestions. Write for Bulletin 105-C which may assist you to make improvements.

Installation in Boeing Aircraft Company plant (above) where a great variety of milling cutters, drills, reamers, and other tools are stored safely for quick accessibility.



At left is the Milling Cutter Insert No. 4. Pegs are adjustable.



Above is the 24 Box Insert. Boxes are sub-divided with dividers.

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LYON METAL PRODUCTS, INCORPORATED, *Aurora, Illinois*

LYON METAL PRODUCTS, Incorporated
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Please send ☐ Bulletin 611-B, Lyon Steel Boxes ☐ 105-C Lyon Steel Tool Room Equipment.

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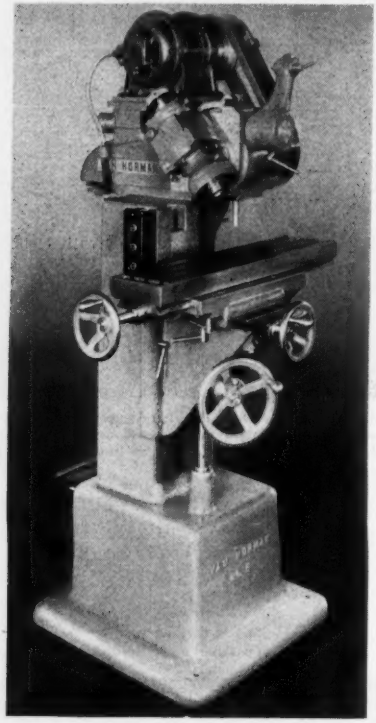
NEW SHOP EQUIPMENT

Van Norman No. 6 Miller

The Van Norman Machine Tool Company, Springfield, Massachusetts, has brought out a miller which will be known as the No. 6. While incorporating the



Van Norman No. 6 Miller

familiar flexibility of previous Van Norman Millers, the design of the machine is somewhat more economical and the machine is of smaller size. The chief difference between the No. 6 and previous machines lies in that it is built with hand feeds only. It is designed to handle, with a minimum of set-up time, the wide range of operations occurring in pattern and experimental shops and tool rooms.

As on all Van Norman millers, the cutter head of the No. 6 machine may be swiveled to mill vertically, horizontally or at any angle. Combined adjustments of the cutter head and the ram make it possible to mill any angle throughout the full run of the table with a standard milling cutter. All operations may be completed on practically any type of work without disturbing the original set-up.

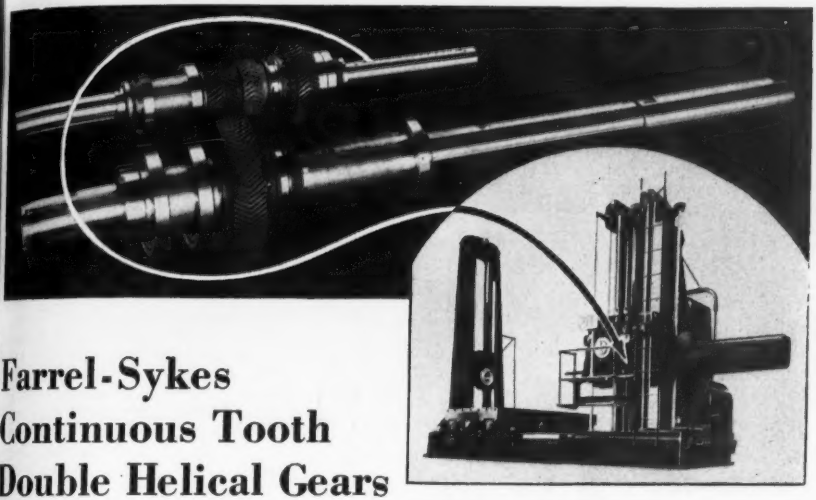
Nine speeds, ranging from 80 r.p.m. to 1450 r. p.m., are available through sliding gears and three-step pulleys controlled by quick change shifting levers. Ample ribbing is provided on the inside of the column and base. The knee of the machine is of box-type construction to permit handling of heavy table loads without distortion or vibration, and the same extra rigid construction is followed in the saddle and table. Anti-friction bearings are used throughout.

Morton Stationary Keyway Cutter and Slotting Machine

The illustration shows the Morton stationary keyway cutter and slotting machine which has been placed on the market by the Morton Manufacturing Company, Muskegon Heights, Michigan. The machine is so designed that the work remains stationary at all times, the correct adjustment for tapering depth of cut and cutting keyways in taper bores being provided for in the guides, cross-head and cutter bar member.

The machine consists primarily of four major units: the top plate, guide and cross-head unit, column, and driving unit. The top plate is rectangular in shape and has a large surface in which T-slots are provided for clamping. The plate is heavily ribbed and cross-ribbed and the lower side is carefully machined and fitted for a bearing surface. It bolts rigidly to the supporting column. The auxiliary top plate between the main top plate and the work serves as a protection in the handling of heavy work and also contains the centering jaws for centering all diameters of bores with a minimum amount of equipment.

A bracket, bored to the front of the top plate, carries a rotating nut and screw mechanism for feed and relief. A graduated locking collar provides for gaging the depth of cut. Rachet feed mechanism



Farrel-Sykes Continuous Tooth Double Helical Gears Enhance Accuracy and Efficiency of Fine Machine Tools.

To maintain the reputation of their horizontal boring, drilling and milling machines for "unexcelled accuracy," the Giddings and Lewis Machine Tool Co., Fond du Lac, Wis., have drawn upon the very latest and best in engineering thought and practice.

One of the refinements that has been built into these machines to give them accuracy, efficiency and smooth cutting action at all speeds and feeds is the use of Farrel-Sykes continuous tooth double helical gears to drive the main and auxiliary spindles, as shown in the illustration above. In addition, all the main drive gears are Farrel-Sykes.

Farrel-Sykes Gears are widely used by leading manufacturers for lathes, planers, radial drills, boring machines and other machine tools. The precision with which they are generated, the accuracy of tooth division and contour, the absence of end thrust, their greater load carrying capacity and higher efficiency, their smooth, quiet operation under all conditions of service, make them ideal for machine tool applications.

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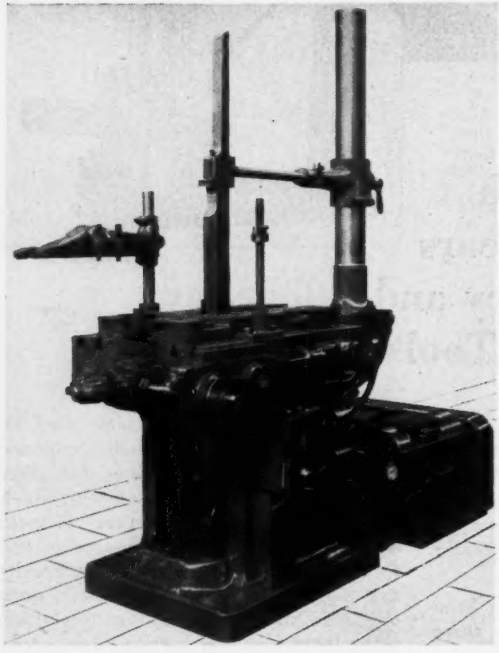
381 Vulcan St., Buffalo, N. Y.

FARREL-SYKES *"The Gear With a Backbone"*

with feeds ranging from 0.001 to 0.020 inch of stroke is also attached to the top plate, and is so arranged that when the cutter reaches the predetermined depth a friction slips, limiting the depth and making possible duplication of depths without resetting.

The guide is journalled in a special trunion member and contains all of the gearing for transmitting power to the spiral cut pinion and rack which reciprocates the cross-head and the cutter bars. The guide can be locked positively with the trunion member; thus the guide, cross-head and bar may be adjusted to any angular position with the surface of the top plate up to one inch taper per foot. The cutter then traverses in this same angular setting and feeds and relieves by means of a relative lateral movement between the trunion and the top plate.



Morton Stationary Keyway Cutter and Slotting Machine

The column is a box-shaped casting, heavily ribbed to support the top plate and heavy loads such as fly wheels, propellers, and other heavy work. The shifting and stroke-adjusting mechanisms are attached to the column and are driven through a universal shaft from the lower extremity of the guide.

The driving unit comprises a gear box in which two clutches operating in opposite directions run in a bath of oil, reciprocation being obtained by engaging one or the other of the clutches. The motion is transmitted to the guide of the machine by means of a universal joint spline shaft. Power is supplied by either a constant speed D. C. or A. C. motor driving through mutliple V-type belts. All moving parts are lubricated from a centralized system.

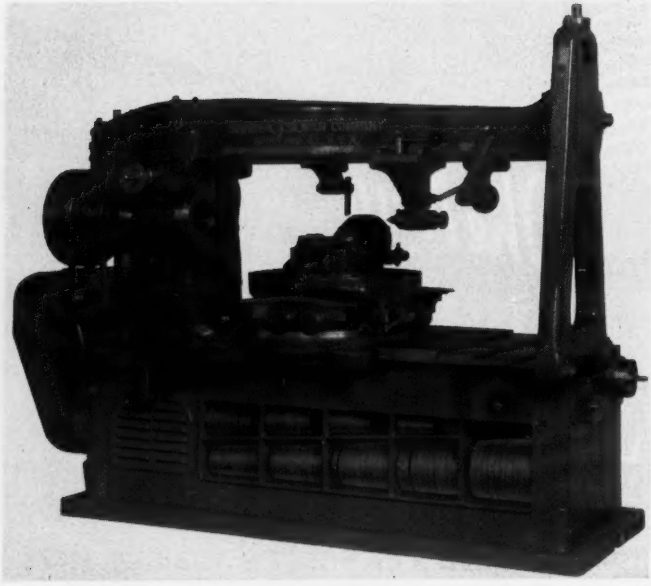
The cutter bars are of rectangular section, heat treated steel forging. Accurately-finished tool slots are provided for inserted type high speed steel cutters and the pressure surfaces are lined with removable hardened liners. The machine can be furnished in sizes ranging from 30 inches to 60 inches cutting stroke.

Barber-Colman Type T Taper Spline Hobbing Machine

To meet the need for a satisfactory method of holding gears, pulleys, or other parts on the ends of shafts, the Barber-Colman Company, Rockford, Illinois has developed a "taper spline".

According to the Barber-Colman engineers, the taper spline does not weaken the shaft, but rather strengthens it in addition to providing larger area of key contact, integral keys, and a much stronger coupling. It is clear that this construction is at least three times as strong as a single key and is fully as accurate. It is adaptable to any kind of machine or mechanism requiring a gear, wheel, pulley, or similar unit to be mounted removably on an end of a shaft, stud, axle, or similar piece; it can be produced without difficulty in any of the commonly used materials, and its cost of manufacture is little, if any, more than a single key.

To produce the Barber-Colman taper spline, this firm has brought out the taper spline hobbing machine illustrated here-



Barber-Colman Type T Taper Spline Hobbing Machine

with. In many respects the machine resembles the regular Barber-Colman Type A hobbing machine, and it can be used for all kinds of standard hobbing work when it is not employed on taper splines.

The hobbing slide swivel construction is the main point of difference, as a means had to be provided to traverse the hob not only laterally, but also longitudinally. The hob is of tapered form; the longest teeth enter the work first and cut the deepest part of the keys. As the hob moves along the shaft, it also moves across it so that progressively shorter teeth cut shallower portions of the splines until the end is reached. A given hob can produce a variety of tapers on a given size of shaft, but for each different size of shaft, a separate hob will be required.

The operating and controlling mechanisms for this machine are naturally somewhat different than the ordinary hobbing machine. An additional feed screw in the lower hob swivel slide gives the hob its longitudinal traverse. Special micrometer dials on the work slide and main feed screw aid in positioning these members accurately for loading. A scale on the overarm and a fixed stop position the work properly. A single large gear box on the left end of the machine contains all the change gear trains so that the complete change gear set-up can be completed in one position. All of the controls are on the front of the machine handy to the operator.

The machine is powered with an electric motor mounted in the base behind a ventilated cover. Automatic stops and safety stops are provided in the two traversing slides. A quick action tailstock helps to speed up loading and unloading between cuts. Centralized pressure lubrication supplies adequate oil to all important points. Bed ways are protected by heavy telescop guard-plates. Coolant is strained o chips and circulated through reservoir in the base. The machine is of rugge construction and accurate to an unusually high degree. No specialized skil is required to operate the machine; any hobbing machine hand can easily run it.

Taper Spline Produced in BC Taper Spli Hobbing Machine

New Delta "Slo-Speed" DRILL PRESSES

A Precision Tool For All Metal Drilling

Precision, accuracy, convenience, and unusual value — that is what every Delta quality tool offers you. The New Delta "Slo-Speed" Drill presses, priced as low as $29.85 for the bench model, are a revelation in action! They are efficient for all types of metal drilling —in factories, machine shops, garages, and service stations. Their range of speeds enables them to be used in any general shop with drills from No. 60 up to 17/32" with utmost efficiency.

Speeds 390, 745, 1280, 2050 R. P. M.

Model No. 1295 Bench Type Delta "Slo-Speed" Drill Press, with Delta-Grip chuck, motor bracket, motor pulley and belt, but without motor..... **$29.85**

Either of the three "Slo-Speed" models, bench or floor type, can be supplied with "Delta-Grip" Chuck. Jacob's Chuck, Tapping attachment or Spindle for No. 1 Morse taper shanks. Floor model may be fitted with special production table. Ask your dealer about these Delta "Slo-Speed" Drill presses or write direct to factory for full details.

Overall Height	37"
Table Travel	11½"
Spindle Travel	4"
Max. Distance, Table to Spindle	17"
Drills to Center of Circle	14"
Takes Drills up to	17/32"
Table Size	10"x10"

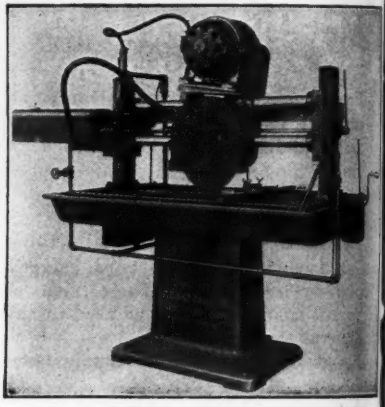
DELTA MFG. CO.

3775 No. Holton St.
Milwaukee, Wisconsin.

Campbell Model 302 Horizontal Wet Abrasive Cutting Machine

The Campbell Model 302 Horizontal Wet Abrasive Cutting Machine shown in the illustration has been added to the line of cutting machines made by Andrew C. Campbell Division of American Chain Company, Inc., Bridgeport, Conn.

This machine was designed primarily for making long cuts through flat or slab stock, but bars can also be cut. An unique hydraulic feed mechanism permits the abrasive cutting of larger sizes of flat material than have heretofore been considered practical. This hydraulic feed can be regulated for speed or feed



Campbell Model 302 Horizontal Wet Abrasive Cutting Machine

with infinite variations between the maximum and minimum rate, a feature that is of prime importance when cutting fragile materials. It also prolongs the life of wheels used in cutting steels.

Cutting is done by a revolving thin abrasive disc to which is applied a continuous and uniform application of a liquid coolant by a method developed by Campbell engineers. Among the wide variety of flat materials that can be cut on the Model 302 are glass, porcelain, brick, stone, tile, steel, copper, cast iron, hardened steel and alloys of all descriptions.

The danger to workmen because of dust and grit-ladened air is eliminated because cutting is done by the Campbell liquid coolant method, which is important from the standpoint of safety and reduction of industrial hazards.

Brown & Sharpe No. 2 Light Type Plain Milling Machine

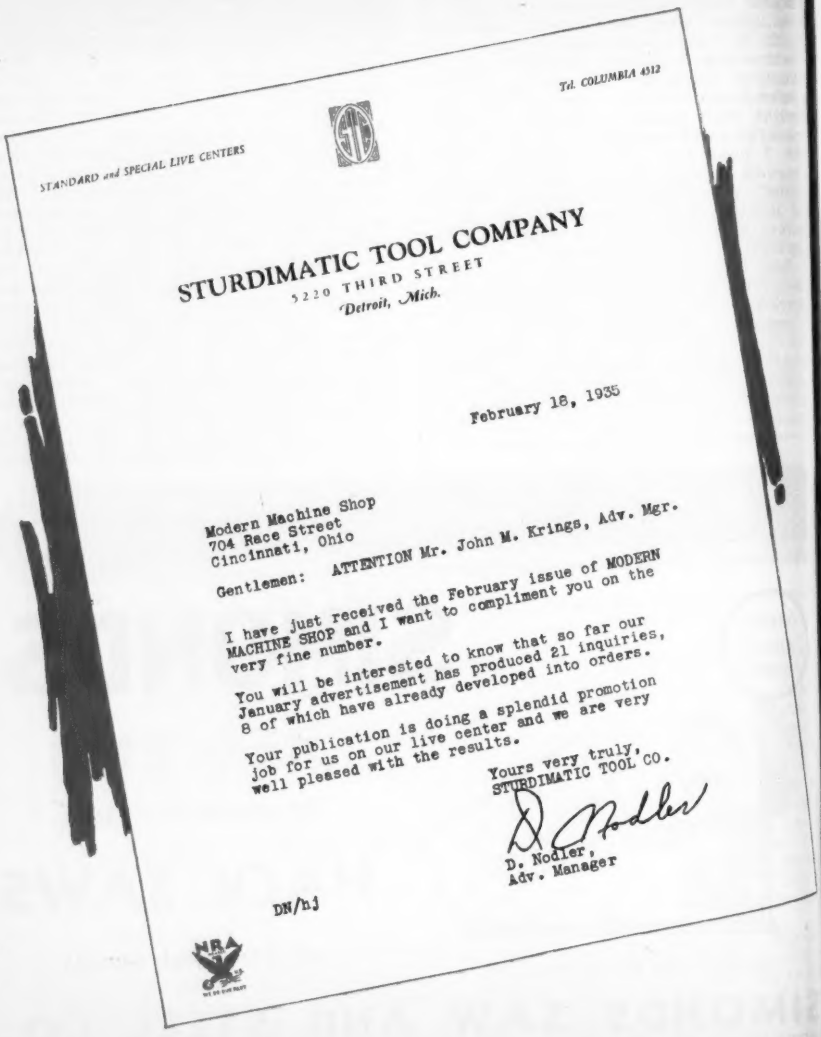
The Brown & Sharpe Manufacturing Company, Providence, Rhode Island has augmented its line of milling machines by the addition of the No. 2 light type plain milling machine shown in the illustration. This machine is designed to offer certain advantages on work of the lighter class, and many advanced points of design and modern construction features are employed. Contrary to the trend of machine tool design during recent years toward increased size and weight with added horsepower, multiplicity of controls, and so on, the B. & S. No. 2 light type plain machine might properly be termed a "simplified machine"; simplified intentionally, and is of not-too-heavy proportions so as to permit sensitivity and easy handling while insuring rigidity and accuracy.

Both the spindle and the table have been lowered to permit more convenient operation and handling. The machine is a completely self-contained motor-driven unit, a flanged type motor being employed with the motor pinion meshing with an internal gear on the main drive shaft. The motor runs only when the machine runs and is controlled by a starting lever which also serves to apply the brake for quick stopping. Motors can be supplied for usual voltages, A.C. or D.C., and all wiring is enclosed so that it is fully protected, yet accessible.

A wide range of speeds is available, the speeds being arranged in two series giving sixteen spindle speeds from 40 to 1300 r.p.m. which are obtained through a convenient rotating lever on the side of the column in conjunction with the back gear and high and low series lever. Convenient single lever feed control is also provided for the 16 feed changes from ½ inch to 18¼ inches per minute. All feeds can be disengaged by placing the feed lever in "locked" position, thus preventing accidental engagement of feeds when power feeds are not required. The directional longitudinal feed engagement is provided on the front of the table in addition to the transverse and vertical feed engagement levers on the side of the knee. The usual hand adjustments are available. The face on which the knee rests is set back approximately four inches from the end of the spindle, providing added clearance for vises, fixtures, and work, especially when using end mills, and it also permits cutters to be set nearer to the spindle nose.

Feed and speed gears are of heat

"Our January Advertisement
8 of which have alread



STANDARD and SPECIAL LIVE CENTERS

Tel. COLUMBIA 4512

STURDIMATIC TOOL COMPANY
5220 THIRD STREET
Detroit, Mich.

February 18, 1935

Modern Machine Shop
704 Race Street
Cincinnati, Ohio

Gentlemen: ATTENTION Mr. John M. Krings, Adv. Mgr.

I have just received the February issue of MODERN MACHINE SHOP and I want to compliment you on the very fine number.

You will be interested to know that so far our January advertisement has produced 21 inquiries, 8 of which have already developed into orders.

Your publication is doing a splendid promotion job for us on our live center and we are very well pleased with the results.

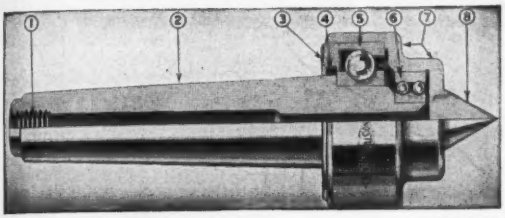
Yours very truly,
STURDIMATIC TOOL CO.

D. Nodler,
Adv. Manager

DN/hj

...as produced 21 inquiries, ...developed into orders"

STURDIMATIC LIVE CENTER for LATHES, GRINDERS and MILLING MACHINES



It turns with the work.
Eliminates friction of dead center.
Lowest possible overhang prevents vibration and chatter.

Write for Catalog and Free Trial Offer

STURDIMATIC TOOL COMPANY — 5222 THIRD ST., DETROIT, MICHIGAN

HERE is another typical example of the result-producing ability of MODERN MACHINE SHOP.

The letter illustrated at the left tells its own story. Above is the advertisement which produced these results.

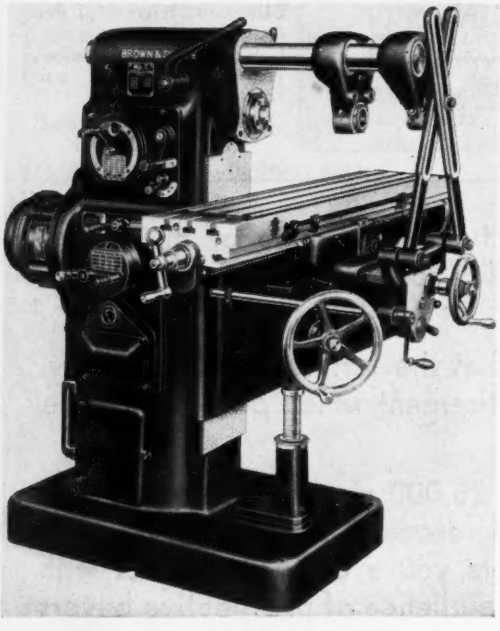
With its more than 25,000 circulation each month among mechanical executives, MODERN MACHINE SHOP offers you a definite contact with BY FAR the largest audience of prospective buyers of your product.

Start your selling messages with the April Issue.
Send copy now. Forms close March 25th.

MODERN MACHINE SHOP

704 RACE STREET
CINCINNATI, OHIO

treated alloy steel, the teeth being ground. The spindle drive is always through the spindle gear mounted on the spindle directly behind the front bearings and driven through six integral splines. All driving shafts in the column are splined and mounted on anti-friction bearings. Lubrication is provided through a pressure oiling system controlled by a plunger type pump. A tank for holding coolant is built into the base of the machine and the machine is arranged to take a compact, individual motor driven centrifugal coolant pump.



Brown & Sharpe No. 2 Light Type Plain Milling Machine

The capacity of the machine is: longitudinal feed, 28 inches; transverse feed, 10 inches; vertical feed, 15 inches, all automatic. The net weight of the machine is approximately 2400 lbs., including a 3 h. p. motor which is standard equipment.

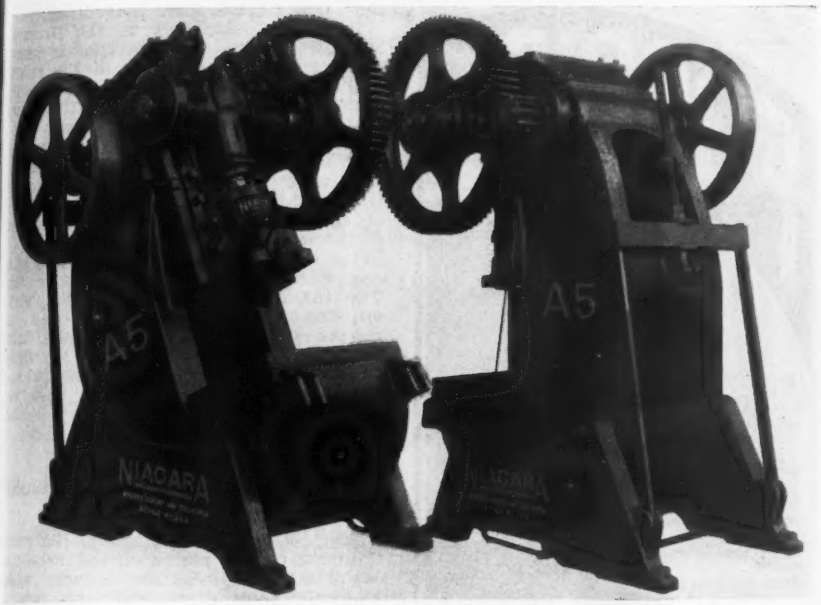
To add to the general usefulness and operating efficiency of the machine an universal milling attachment with crane has been developed, furnished as extra, which permits the attachment to be slung to the side of the machine when not in use, yet instantly available. The attachment has the new Brown & Sharpe cam lock construction for holding cutters, and so on, which provides ease of insertion and removal with assurance of a positive drive. It is driven by heat treated alloy steel spur and bevel gears mounted on spline shafts supported on anti-friction bearings. The wide range of adjustment of the attachment, together with the speed range of 82 to 2672 r.p.m. provides a means of handling a great variety of work using shell end mills from approximately 2¾ inches diameter to the tiny end mills used in mold and die work. A finished pad is provided on the side of the machine to which the attachment can be bolted when not in use. A slotting attachment can also be handled by the crane in place of the universal milling attachment, as desired.

Another feature is the provision for obtaining short leads and fine feeds by the use of a short lead and feed reducing attachment furnished as an extra which is driven from the table feed screw. This attachment may be used with the universal index center and universal milling attachment for obtaining short leads. When used without the universal spiral index centers, feeds 1/20 of the indicated lead are given for work requiring extremely fine feeds such as milling with a fly cutter. It also permits obtaining leads 1/20 of normal when geared to the front of the headstock spindle.

A vertical milling attachment can also be furnished which clamps to the overarms and is adjustable horizontally. Hand feed rotary attachments in 10 and 18 inch size and 18 inch power feed rotary attachment are also available for this machine.

Niagara No. A-5 Press

The illustration shows front and rear views of a press of improved design that has been placed on the market by the Niagara Machine and Tool Works, 689 Northland Avenue, Buffalo, N. Y. The press, which is to be known as the Niagara No. A-5 press, has a one-piece, steel casting frame scientifically designed to incorporate not only a high factor of safety, but also maximum strength and rigidity



Niagara No. A-5 Press

vertically, horizontally and torsionally. It is built to afford rigid gib mountings, maximum of rigidity about the upper bearings, rigidity of the back shaft mounting and stiffness of bed.

The crank shaft, which is forged, turned and ground, is five inches in diameter with a 6¼-inch crank pin. The shaft runs in bronze bearings which are split at an angle of 45 degrees from the vertical so as to transmit the entire thrust direct to the frame. This construction is said to assure a true bearing and to avoid having the center of the bearing load occur on a joint between the frame cap and the frame. The press is equipped with a six point engagement pin clutch, providing prompt engagement and the maximum possible strokes per minute. Six points are provided for elimination of lag, thus enabling the press operator to synchronize his feet and his hands. The clutch is provided with a safety stop to prevent repeating and with a device to lock the clutch pin out of engagement when setting dies.

The six point engagement wheel facing, which is of solid hardened and ground forged steel, can be removed by removing six free-fitting bolts. No fitting of any kind is necessary. The brake is equipped with a spring that automatically compensates for expansion due to heat of operation or wear.

The slide is extremely rigid and has an unusually generous support for the die, especially from the center of the slide forward. The solid casting of the slide itself is brought forward, thus furnishing a solid backing for the mounting of dies. In addition to the main hole at the center on the bottom of the slide, there are two holes at the back, one in the front and two on each side for attaching dies.

A new "Breech Block" type of die clamp is used, of cylindrical shape and ground to close tolerance. It fits in a smooth bored hole, the center of which is sufficiently above the bottom of the slide to prevent it from sagging. Being contained within the slide, it has no vertical play and provides solid support for the die under pressure.

The triple V gibs on each side of the slide are designed for rigidity, as well as to provide adequate bearing surface. This type of gib retains a true bearing under excessive loads. The gib bolts are placed very close to the slide, so that

they will receive their load directly.

The back gear shaft of the Niagara No. A-5 gear press runs in Timken Bearings. The large diameter of the shaft enables the use of oversize bearings and reduces damaging deflection. The back shaft, with its bearings, comprises a self-contained assembly mounted in a heavy rigid tubular casing. The casing is strong and rigid, thus transmitting the load of the gearing directly to the frame and obtaining the best possible distribution of the load.

The press can be inclined easily by one man without the aid of a crane or helper. The inclining device is equipped with anti-friction thrust bearings and is located sufficiently high above the floor so that a man can operate it while standing. All parts of the press, including the adjusting screw, are so designed as to be above the floor line, even in the inclined position.

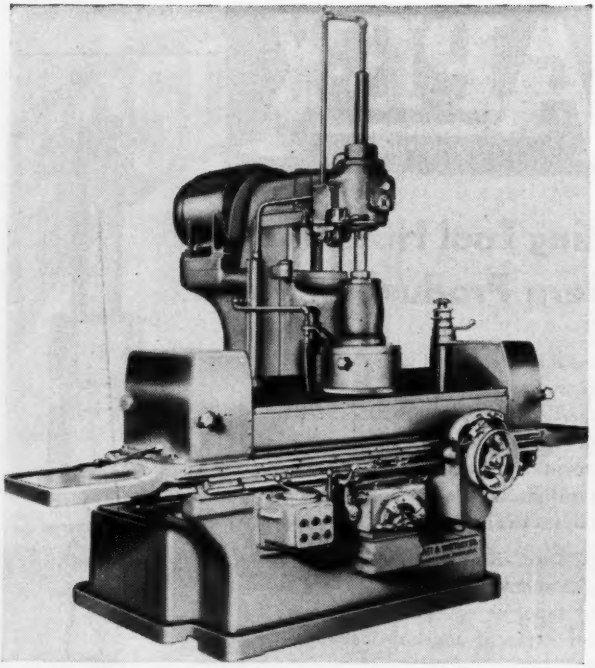
Pratt & Whitney 14-Inch Hydraulic Vertical Surface Grinder

Pratt & Whitney Company, Hartford, Connecticut, has placed on the market a 14-inch Vertical Surface Grinder with hydraulic table drive, and table speeds from zero up to 100 feet a minute. This new machine is characterized by its increased weight and power, and by the much higher table speeds available.

The drive to the spindle is the same direct geared connection that has proved so satisfactory in Pratt & Whitney Vertical Surface Grinders for many years. The motor is up out of the way, and its full power is transmitted to the wheel through a pair of hardened nickel steel spiral bevel gears particularly developed for this drive. These gears run in oil at all times. The standard spindle speed is 1265 r.p.m., but special gear ratios can be supplied if a different spindle speed is required.

The entire spindle and drive mechanism is ball bearing mounted, using preloaded bearings which are fully protected from dirt and moisture. The spindle and wheel flange are one-piece, and the upper end is splined where it slides through the spiral bevel gear. The lower spindle bearing absorbs the thrust of the grinding cut. End play in the spindle is prevented by a series of compression springs which support the upper bearing. The springs are of sufficient capacity to carry the dead weight of the spindle and wheel parts, and keep the spindle in automatic adjustment, preventing wheel sag.

The wheel used is 14 inches diameter,



Pratt & Whitney 14-Inch Hydraulic Vertical Surface Grinder

5 inches high and 1½ inches thick. It is held in a cast iron wheel mount which bolts to the spindle flange. Wheels can be changed in a few minutes. Wheel truing is accomplished by a built-in device on the end of the table.

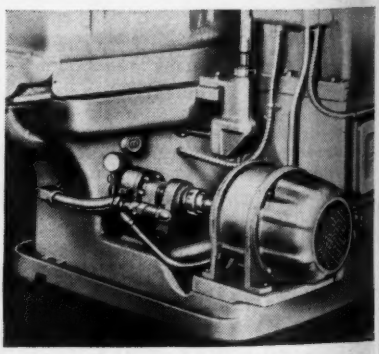
The wheel down-feed mechanism is of the ratchet wheel and pawl type, and produces power feeds ranging from 0.00025 inch to 0.005 inch at each end of the table stroke. In addition, either a slow or a fast hand wheel feed is engaged by pulling the handwheel in or out. The wheel head is mounted on broad vertical ways, with a narrow guide for accurate alignment.

The hydraulic mechanism is driven by a separate 5 h. p. motor mounted on a pad on the bed on the right rear side as shown in the illustration. Oil for the hydraulic system is carried in a tank in the base of the column, and is drawn from this tank through a filter. The table speed can be varied from zero up to 100 feet a minute, controlled by a valve and lever on the front of the bed under the operator's hand. Two adjustable stops are provided for quick setting of particular speeds. The table is automatically reversed, the point of reversal being controlled by dogs which can instantly be adjusted.

The table is fully enclosed by adjustable sheet metal guards which confine the spray of coolant from the wheel. Coolant is supplied to both the inside and outside the wheel from a tank cast in the bed at the left rear. A separate ½ h. p. motor drives a built-in coolant pump.

All controls are grouped on the front of the machine and are very simple. Push button control is provided for all three motors, and on top of the push button box is the lever for magnetizing or demagnetizing the magnetic chuck. Red lights in the box show which way the current is engaged.

Lubrication is controlled through a reservoir system thus oiling is simple and positive. The machine weighs 12,000 lbs. including the three motors, and all castings are heavily ribbed for stiffness. The table working surface is 12 x 30

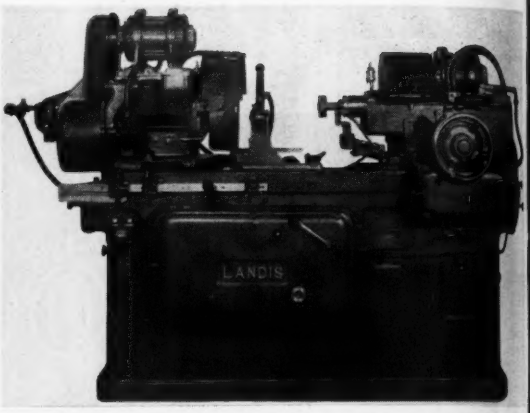


Hydraulic Drive Mechanism On Rear Of Bed, Showing 5 H. P. Driving Motor and Pump

inches with a maximum longitudinal travel of 45 inches. A magnetic chuck is used with a working surface 11 x 34 inches. The machine occupies a floor space 14 feet 5 inches long, 7 feet 4 inches wide and is 9 feet 7 inches high.

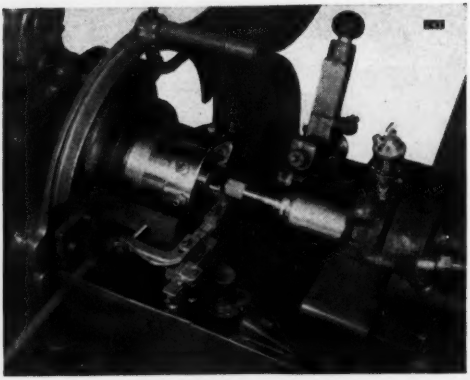
Landis 15-Inch Type C Hydraulic Internal Grinder

With the introduction of the Landis Type C hydraulic internal grinding machine shown in the illustration, the Landis Tool Company, Waynesboro, Pennsylvania, builders of cylindrical grinding machines for many years, enters into the production internal grinder field. The machine illustrated may be used for the rapid production grinding of duplicate or similar parts within a close degree of accuracy and are sufficiently flexible to serve with equal efficiency for small lot grinding of a wide variety of work.



Landis 15-Inch Type C Hydraulic Internal Grinder

The machine is offered in two sizes. The 15 x 8-inch size is recommended for the grinding of smaller bores and has as its outstanding feature the Landis-Solex sizing device and a hydraulically reciprocated grinding wheel fixture. The 15x11-inch size is intended for the deeper bores. The former machine may be furnished as



View showing Landis-Solex Sizing Device

a plain machine; that is, without automatic sizing or hydraulic reciprocated grinding wheel fixture when rapid production is not necessary. On the other hand, the latter machine is only supplied with these two high production features upon special order.

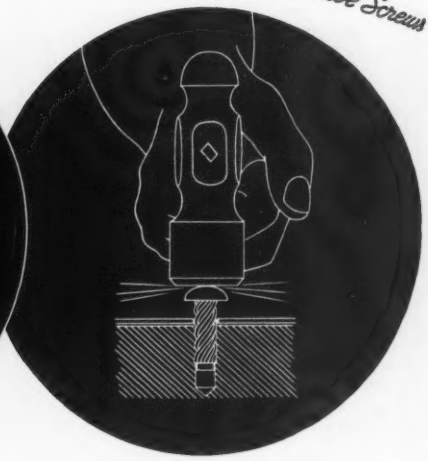
The Landis-Solex sizing device is responsible for the close, consistent accuracy of the machine. It functions during the entire grinding cycle directly from the work diameter and thus such variables as wheel wear, difference in amount of stock to be removed, and spring in the grinding wheel quill do not effect its accuracy. It may be used for any straight or tapered hole whether blind or not. With equal efficiency it will size many splined, key-way, or interrupted holes.

When grinding bores 2¾ inches in depth or less (and most bores ground on a high production basis fall within this range), the grinding wheel fixture is hydraulically reciprocated. A massive bridge-type bed section supports the wheel base and grinding wheel fixture, thereby further eliminating vibration. Bores having a depth greater than 2¾ inches are ground by hydraulically reciprocating the work table.

Another feature of importance is the grinding wheel quill spring compensating device. By its use the cross feed automatically compensates for any spring in the grinding wheel quill, thereby effecting

Make it Better... Make it Cheaper with Hardened Metallic Drive Screws

8 tapping operations eliminated - 50% saved - in fastening valve guides to Deming Pump oscillator



Tapping Eliminated—50% SAVED

This simple fastening job calls attention to an opportunity for cost reduction on hundreds of different products which have to be permanently assembled. Tapping, riveting or other costly and unhandy operations can be avoided in making practically any assembly of this type.

Much cheaper and faster work can be done with Hardened Metallic Drive Screws. Proof of this is given by innumerable users. The saving of 50 per cent which was made over tapping in fastening valve guides to the oscillator in Deming Pumps is typical of what has been accomplished on thousands of permanent assemblies.

Even where great holding power is essential, Hardened Metallic Drive Screws can be safely employed to save time and labor. Unbiased tests demonstrate that these money-saving Screws actually *HOLD BETTER than machine screws under tension, shear and vibration.* Their great security gives them a wide range of use. Also it means better as well as cheaper fastenings.

Check over your permanent fastenings to iron, brass and aluminum castings, steel or plastics. Try out these unique Screws that form their own thread in the material as you hammer them into a drilled or formed hole. You'll profit if you can use this easiest, quickest, cheapest method. We'll furnish FREE SAMPLES FOR TRIAL, with complete recommendations of our Assembly Engineers, as soon as you send a brief description of the fastenings you wish to make.

PARKER-KALON CORPORATION
Dept. M, 198 Varick Street, New York, N. Y

PARKER-KALON TYPE "U" HARDENED METALLIC DRIVE SCREWS

PATENTED No. 1,462,151 - No. 1,912,222 - No. 1,978,145 - No. 1,978,329

Type "Z" Hardened Self-tapping Sheet Metal Screws
For joining and making fastenings to sheet metal up to six gauge; also aluminum, die castings, Bakelite, etc. Simply turn Screw into drilled, pierced or molded hole. It forms a thread in the material as it is tu. ned in. Can be removed and replaced.

Hex Head Hardened Self-tapping Cap Screws
For making fastenings to sheet metal from 24 gauge to 10 gauge, and also to steel plates and structural shapes up to ½ inch thick, solid brass, bronze, die castings, etc. They function like the Type "Z" Screws but are driven with a wrench

great wheel economies. Bores having steep tapers with angles to 90 degrees may be handled on the standard machine. A compact water, oil and air pump mounting of great simplicity is located at the rear of the bed.

Following are some of the outstanding features of design: (a) An Ex-Cell-O ball bearing spindle sturdily supported well out toward the wheel and driven in such a manner as to insure the delivery of even an ample power to the spindle regardless of the load; (b) a grinding wheel feed which operates automatically or manually through the medium of a large feed screw and nut; (c) a simple and effective wheel base hydraulic back lash and (d) a rigidly webbed bed of box type construction, having the water reservoir integral at the rear of the oil reservoir in its base.

The net weight of the 15 x 8-inch machine without electrical equipment is 5500 pounds. Net weight of the 15 x 11-inch machine without electrical equipment is 5800 pounds. A ¾ h. p. constant speed work driven motor is used on the 15 x 8-inch size and 1 h. p. constant speed motor on the 15 x 11-inch size. The pump drive motor is 1½ h. p. constant speed in both cases. Either a 3 or 5 h. p. constant speed wheel drive motor is used on the smaller machine, the larger machine requiring a 5 h. p. constant speed motor.

Stearns Type "AM" High Duty Magnetic Separator

A machine which automatically separates iron, steel, or other magnetic particles from any substances with which it may be mixed has been placed on the market by Magnetic Manufacturing Company, 615 South 28th Street, Milwaukee, Wisconsin. The design of the machine includes two belt conveyors, one which is mounted below and at the end of the other. Within the upper conveyor is mounted an electro magnet, energized by alternating current. As the lower belt, which is the feeder, delivers the mixed material to the point of discharge, the iron or magnetic particles are lifted by the upper conveyor and held in suspension, at the same time highly agitating the material so as to clean and free the material of any non-magnetic particles.

Thus the magnetic particles are carried to the end of the conveyor and as the belt leaves the magnetic field, are automatically discharged at this point, while a similar operation is taking place on the non-magnetic material. Most of the non-

FASTER METAL CUTTING

with the

WELLS BAND SAW

Built in 2 Sizes:

No. 8—Capacity 8" x 16"

No. 4—Capacity 4" Rd. or 7½" x 3"

CHECK these advantages—

Continuous Cutting.

Cutting time reduced one-half or more.

No excessive heating of blade.

Cuts any shape or thickness of metal.

No coolant required.

More accurate cutting.

Rigid ball bearing saw guides.

Simple and convenient two-piece vise.

Long blade life and low blade costs.

Cutting at any angle.

Now you can reduce your metal cutting time by one-half or more. This simple durable machine utilizes the band saw principle WITH CONTINUOUS CUTTING. It can be operated at high speed without the use of coolant because excessive friction is eliminated, and enables you to make substantial savings in cutting costs.

The Wells Band Saw will handle any metal, regardless of thickness, shape, or size within the capacity of the machine.

The long life of the blades and their low initial cost will cut your blade expense to a minimum.

For general work or production, the Wells Band Saw will enable you to reduce metal cutting costs by making 50% more cuts in the same time with a corresponding reduction in labor cost per cut. You cannot afford to be without it.

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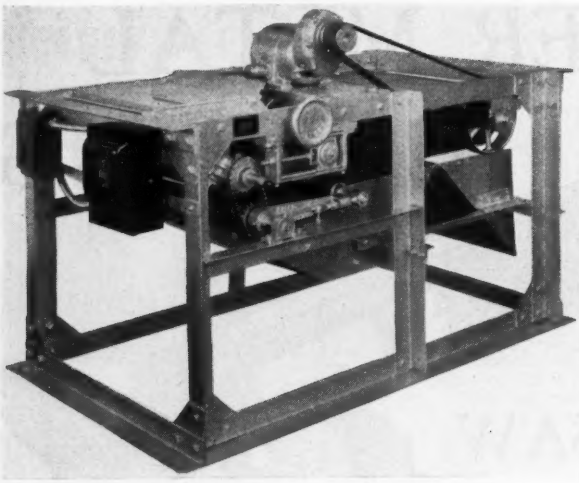
THE WELLS MANUFACTURING CORP.

THREE RIVERS, MICH.



Stearns Type "AM" High Duty Magnetic Separator

magnetic material is discharged at the end of the feeder belt and the balance, while the mixed material is hanging in suspension, passes through the magnetic field.

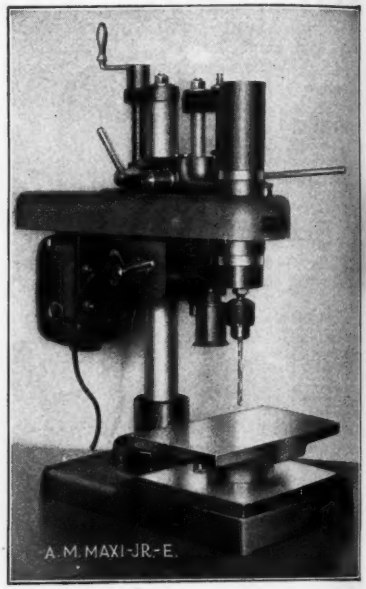
Thus the magnetic is thoroughly separated from the non-magnetic material while in the magnetic field, the AC current providing high agitation; that is, at the rate of 120 cycles per second on a 60 cycle current.

The speed of the belt varies with the kind of material. The speed range is, however, from 75 to 150 feet per minute. A spur gear motor reducer is invariably furnished with the machine, including the starter switch. The machine is built in various sizes, depending upon the problem to be handled. The size of the machine shown in the illustration, however, is 66x43x46 inches. The machine

has considerable application, especially in the treatment of finely ground materials where a heavy burden of iron of high magnetic content is encountered. Magnetite iron ore, sponge iron, copper powder, and similar materials can be treated on this machine to advantage.

Maxi-Jr. Super Sensitive Bench Drilling Machine

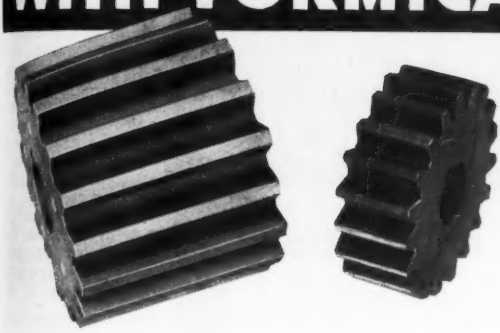
The Maxi-Jr. Super-Sensitive Bench Drilling Machine shown in the illustration is the latest addition to the line of super-sensitive bench drilling machines manufactured by Adolph Muehlmatt, 436 Elm St., Cincinnati, Ohio. The Maxi-Jr. has a drilling capacity from the smallest drill made to ¼-inch in any drillable material and has a work capacity of 10x 10 inches. The spindle speeds obtainable range from 750 to 12,000 r.p.m. The machine is completely self-contained.



Maxi-Jr. Super Sensitive Bench Drilling Machine

The column, which is 18 inches high x 1¾ inch diameter is accurately ground from solid steel and is rigidly mounted on a substantial base. The platen of the base, which is 8x7 inches in area, is ground accurately at 90 degrees to the column. A 1¼-inch hole is provided in

CUT DOWN NOISE WITH FORMICA



FORMICA gears reduce noise—and noise is one of the biggest resistances in the sale of many kinds of machinery. Noise is also an indicator of the difference between a machine that is well taken care of and one that is not.

Therefore Formica gears are popular both with machinery manufacturers and maintenance men. Quick service on one or many gears can be given by any of the gear cutters named.

THE FORMICA INSULATION COMPANY
4632 Spring Grove Avenue Cincinnati, Ohio

FORMICA

FORMICA GEAR CUTTERS

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Farrel-Birmingham Co., Inc. Buffalo, N. Y.
Slaysman & Company Baltimore, Md.
Harry A. Moore Bangor, Me.
The Union Gear & Mch. Co. Boston, Mass.
The Atlantic Gear Works New York City
Chicago Rawhide Mfg. Co. Chicago, Ill.
Perfection Gear Company Chicago, Ill.
Mechanical Specialty Mfg. Co., Chicago, Ill.
Merkle-Korff Gear Co. Chicago, Ill.
Chicago Gear Company Chicago, Ill.
The Cincinnati Gear Co. Cincinnati, Ohio
The Horsburgh & Scott Co. Cleveland, O.
The Stahl Gear & Machine Co., Cleveland, O.
The Master Electric Co. Dayton, O.
The Adams Company Dubuque, Ia.
The Ferguson Gear Co. Gastonia, N. C.
Hartford Special Mchny. Co. Hartford, Conn.
Beaty Machine Works Keokuk, Ia.
The Generating Gear Co. Milwaukee, Wis.
Badger State Gear Co. Milwaukee, Wis.
Precision Machine Co. Milwaukee, Wis.
E. A. Pynch Co. Minneapolis, Minn.
Joaquin Alemany Lopez Havana, Cuba
New Jersey Gear & Mfg. Co., Newark, N. J.
J. Morrison Gilmour 151 Lafayette St., New York City
Sier-Bath, Inc. New York City, N. Y.
E. M. Smith Machine Co. Peoria, Ill.
The Eagle Gear & Mch. Co. Philadelphia, Pa.
Rodney Davis and Sons Philadelphia, Pa.
The Pittsburgh Machine & Supply Co. Pittsburgh, Pa.
Standard Gear Co. Pittsburgh, Pa.
H. W. Honeymon & Son Providence, R. I.
Perkins Machine & Gear Co. Springfield, Mass.
Winfield H. Smith, Inc. Springville, N. Y.
Alling Lander Company Sodus, N. Y.
Charles E. Crofoot Gear Corp., South Easton, Mass.
Arlington Machine Co. St. Paul, Minn.
Farwell Mfg. Co., Toledo, O.
Diefendorf Gear Corp. Syracuse, N. Y.
Worcester Gear Works Worcester, Mass.
Massachusetts Gear & Tool Co., Woburn, Mass.

NON METALLIC GEARS

the base for a threaded plug onto which the 5½-inch round table is fastened in face plate fashion. The round table, in turn, acts as a foundation for the reception of a 10x6 inch rectangular table, the underside of which is provided with flanged screws that impinge on the underside of the round table.

The drilling unit proper is self-contained and may be swung radially on the column to any position, where it may be locked. The 8-inch vertical adjustment of the drilling unit is accomplished by means of a three-pitch triple threaded screw.

A special feature is the method of driving and feeding the chuck spindle. Power is transmitted from the motor to the chuck spindle through a ⅝-inch flat endless belt. No radial load is transmitted to the chuck spindle, the torsional load of actual drilling only being carried by the spindle. The feed unit maintains the chuck spindle in a floating condition at all times. The feed mechanism is operated by means of an universal ratchet and the feed lever may be locked in any one of the 14 positions of the ratchet instantly.

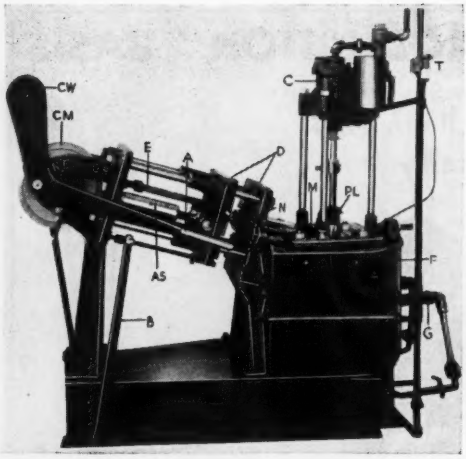
The motor and chuck spindle are full ball bearing. The ½-inch chuck is of tool steel, hardened, seasoned and ground, and the fractional parts of the machine are also ground.

The machine is equipped with a built-in light controlled by an individual switch. Ample guards are provided to protect the operator from dirt or injury.

Newton-New Haven No. 500 Die Casting Machine

A heavy duty plunger-type die casting machine for the pressure casting of zinc and zinc base alloys, to be known as the No. 500 machine, has been developed by the Newton-New Haven Company, New Haven, Connecticut. The features of design include added capacity, quick die mounting, increased speed of production with ease of operation, and added safety.

The machine is of the four-bar



Newton-New Haven No. 500 Die Casting Machine

type, which is set to provide much greater die capacity than the former machines. One of the four sliding bars is removable to facilitate quick mounting of dies with automatic core pulls. Roller bearings have been included in the cam itself and in both cam shaft bearings. A fourth bumper bar has been added at the bottom of the sliding bolster to facilitate ejection in overhanging dies. A safety device prevents the operator making a shot or pump until the die is tightly locked.

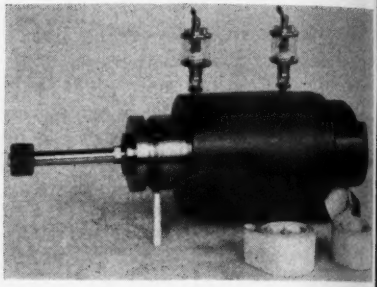
The machine is equipped with automatic temperature control of the metal, insuring a proper casting temperature at all times.

To produce a casting, the operator moves only the levers **A** and **B**, other operations being automatic. The metal is melted in pot **M** by atmospheric gas burners **G** under thermostatic control **T**. Self-aligning dies are clamped to the die bolsters **D**. Opening and closing the dies by means of the lever **A** also turns the cam **CM**. The actual casting operation is actuated by moving lever **B** to the left, which operates the pattern of the air-cylinder **C**. This piston drives the plunger **PL** down and forces the metal into the dies through the nozzle end. Castings are automatically ejected at the opening of the die when the die ejector plate comes into contact with the adjustable bumper bars **E**.

The length of the machine is 8 x 6 inches; width, 3 feet, 7 inches; height, 5 feet, 9 inches, and the weight, 2400 pounds. Die capacity is 9 x 12 x 9 inches thick. The furnace has a capacity of 200 pounds of metal, and the casting rate is from 5 to 10 shots per minute.

Brown & Sharpe Internal Grinding Fixture No. 42

The illustration shows a ball bearing type internal grinding fixture which has been developed by Brown & Sharpe Manufacturing Company, Providence, Rhode Island. The fixture, which is identified as the No. 42, is especially intended for production grinding of holes of various diameters and depths on the Nos. 2, 3, and 4 Universal grinding machines, in both the belt and motor-driven types, and is of rugged design accordingly. The



Brown & Sharpe Internal Grinding Fixture No. 42

body, which is sufficiently massive to absorb vibration, contains a spindle which is mounted on preloaded ball bearings and runs at a speed of 12,000 r.p.m. The constant, predetermined load automatically compensates for any expansion or contraction due to heating.

The wheel arbor is seated by a taper and is held by its threaded end in the spindle. Various wheel arbors are available up to one inch diameter and five inches in length. The spindle is driven smoothly and efficiently by an endless canvas belt which can be readily changed or adjusted. Wheel arbors and grinding wheels are not furnished with the fixture, but are available in sizes as follows; wheel arbors, ½x1⅝ inches for wheels of 9/16 inch diameter with ¼ inch hole, to 1¼ inches, to take wheels 1 1/16 inches diameter with a ⅝ inch hole and grinding

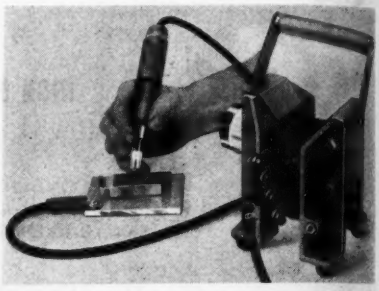
wheels from 1x½x¼ inches to 2½x1x⅝ inches. The correct wheel arbor and grinding wheel should be used on each job.

Taylor "Red-Head" Demagnetizer and Etcher

A combination Demagnetizer and electric etching machine built to accommodate an unusually wide range of work has been placed on the market by Taylor Sales, 15505 Linwood Avenue, Detroit, Michigan. The standard machine is built for 60 cycle, 110 volt A.C. current and can be plugged in on any standard lighting circuit having the above characteristics. A seven-foot power cord with plug is provided, also a suitable length etching cord. The machine draws 80 watts, a cost of one cent per hour, when the demagnetizer only is used. When etching, the tool draws 400 watts of current, costing four cents an hour, for etching at the maximum depth which is 0.003 inch.

The tool is 15½ inches high and five inches long by 4½ inches wide. The etching handle is of wood with a copper insert holding a threaded alloy tips screwed into the copper to carry off the heat while the tool is in use. The etching plate is chromium plated to resist corrosion when not in operation.

Four adjustments are provided for etching, various depths being desirable according to the thickness of the metal to be marked. It is portable and thus can be carried around to various fixtures or machines in order to demagnetize them and thus eliminate the attraction of the machine tables or fixtures for the metal chips.



Taylor "Red-Head" Demagnetizer and Etcher

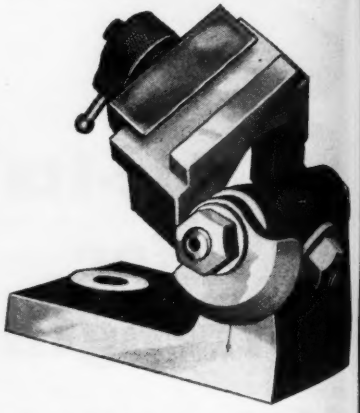
The "Red-Head" is useful for marking milling cutters, drills, dies, and other

tools, and should prove very useful to technical schools and colleges or maintenance departments where it is desirable to identify the tools. The combination flat top and the V gap on the extended poles is said to be an exclusive feature of this tool, permitting a working range of a great variety of shapes and sizes together with extreme hardness.

Covel Universal Angle Vise

Any combination of angles required in milling, drilling, grinding or otherwise machining tools or machine parts can be obtained with the Covel Universal Angle Vise shown in the illustration. It is especially useful in grinding carbide cutting tools, which require many complicated angles for the grinding of shapes and clearance angles.

The tool is finished in accordance with accepted standards of toolroom finish. All



Covel Universal Angle Vise

surfaces are accurately ground, and an accurately-graduated segment is provided so that any degree of angle can be instantly obtained. The work is held by a fulcrum clamp, and the angle adjustments are locked by means of hardened nuts. The locking arrangement is sufficiently positive so that the vise can be used on a surface grinder, milling machine, drill press, or shaper under normal cuts without slippage of work.

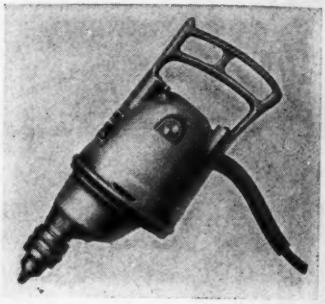
The vise is made in two sizes: Style A and Style B. The Style A dimensions are as follows: Base dimension, 3x4½

inches. Width of jaws, 1¾ inches. Maximum opening, 1¼ inches. Weight, 7 pounds net. Style B: base dimensions, $8\frac{7}{8}$ x 4½ inches. Width of jaws, 4 inches. Maximum opening, 2½ inches. Net weight, 20 pounds.

Signal Type OB-4 Portable Electric Drill

The illustration shows the Type OB-4 x ¼ inch Standard Duty Portable Electric Drill, which has been placed on the market by the Signal Electric Mfg. Co., Menominee, Michigan. The drill is powered by a Signal Universal motor, for 110 or 120 volts, 25 to 60 cycles, either a. c. or d. c., enclosed in an aluminum alloy housing. The speed, no load, is 1700 r.p.m.

All gears are of special alloy, heat treated steel, and the bearings are of bronze, wool packed, with a thrust ball bearing on the spindle shaft. Brushes are easily accessible from outside the housing. The motor is controlled through a positive make-and-break switch of the toggle type. The overall length of the drill is 12 inches, and the weight, net, is 7¼ pounds.



Signal Type OB-4 Portable Electric Drill

The drill is provided with a 3-jaw chuck and key as standard equipment, also 8 feet of heavy duty rubber-covered cord covered with rubber protector, and a rubber plug.

Landis Tap Chaser Rake Grinding Attachment

The Landis Machine Company, Tap Division, Waynesboro, Pa., has placed on the market the attachment illustrated herewith for use in regrinding or sharp-

ening the chasers used in their Landis Style LT and Style LM Receding Chaser Collapsible Taps.

The correct grinding or sharpening of collapsible tap chasers is very vital to the efficient performance of these tools. Improperly ground chasers frequently mean poor threads and short life. It is always important that the rake angle be ground suitably for the material being tapped as different rake angles are required for the different materials.

The attachment is composed of three main parts; first, a base which is adapted for fastening to the table of most makes of tool and cutter grinding machines. Attached to the base is a second part, the swivel bracket, which is adjustable in a horizontal plane in relation to the base. The bottom part of the swivel bracket

Landis Tap Chaser Rake Grinding Attachment

is graduated to permit obtaining the desired degree of azimuth, which is the angle at which the chaser is set from the parallel. The third part of the attachment is the vise base which is clamped to the swivel bracket and which holds the chaser while being ground. The vise can be rotated in the vertical plane and securely clamped at any angle as determined by graduations on the top of the swivel bracket. This permits setting the chaser at the proper elevation for grinding the gun tap in the throat section of the rake.

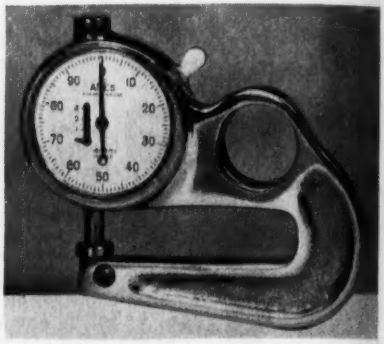
The vise base is provided with a milled flat which will accommodate all sizes of tap chasers. The chaser is held in place by an adjustable spring clamp and locked with a hand screw.

The attachment is suitable for grinding all sizes of chasers employed in the Landis Style LT Collapsible Taps, the Style LM Receding Chaser Collapsible Taps and also those employed in the Victor Collapsible and Receding Chaser Taps formerly manufactured by the Landis Machine Company or the Victor Tool Company.

Ames 2-Inch Throat Pocket Gauge

The B. C. Ames Company, Waltham, Massachusetts, has brought out a "deep throat" gage especially designed for measuring thicknesses of sheet metals. The tool is in the form of a dial gage; thus gaging is practically instantaneous and absolutely accurate. The dial, which is 2 inches diameter, is graduated to indicate thousandths of the inch, yet the graduations are wide enough apart so that fractions of thousandths may easily be estimated. A chart on the back of the gage gives fractions of an inch and corresponding decimal equivalents.

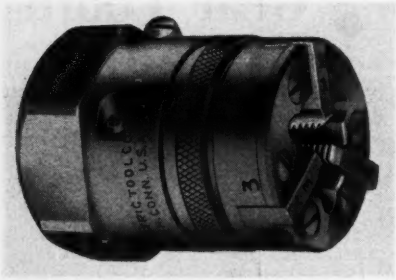
The frame of the gage is of bronze, chrome plated. Other parts of the gage are of rustless metal and the crystal is unbreakable. The design of the gage is such that it is convenient to carry in the pocket; is durable, accurate, and both easy and quick to operate. The gage has capacity for metals up to 5/16 inch in thickness, and weighs seven ounces.



Ames 2-Inch Throat Pocket Gage

Style EJ Geometric Solid Adjustable Die Head

To meet the demand for a light, removable chaser die head to cut small diameter, short length threads such as



Style EJ Geometric Solid Adjustable Die Head

are now being cut with a button die or spring die, The Geometric Tool Company, New Haven, Conn., has brought out the Style EJ Solid Adjustable Die head shown in the illustration.

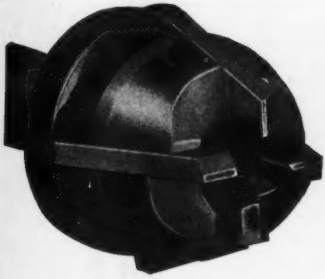
As standard, the die head is tapped for application to the threading spindle of the No. 00G Brown & Sharpe Threader. It can be mounted on the threaded end of a mandrel of any desired diameter and length and thus used on Brown & Sharpe automatics or on any other machine arranged for backing off the thread.

The die head employs a set of three removable, adjustable chasers. By adjusting the chasers, any required decimal size of thread can be cut. The chasers can be resharpened and set back to the original size. A single die covers a wide range of diameters and pitches, although separate chasers are required, of course, for each distinct diameter and pitch.

The chasers are located, in relation to the center of the work, by a cam fitting in lug slots on the bottom of the chaser. While the chasers are held in place by a face plate, they protrude through the face plate, thus permitting close-to-shoulder threading without the use of projection chasers. All major parts of the die head are of special alloy steel, hardened and ground.

Craley Boring, Turning, and Facing Head

The boring, turning, and facing head shown in the illustration has been placed



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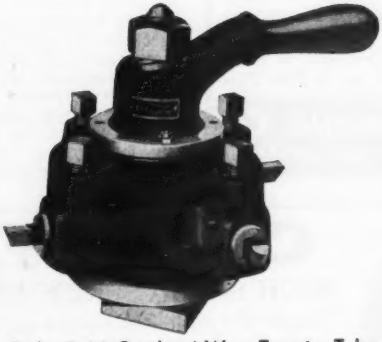
McCrosky Turret Tool Posts

ENABLE engine lathe operator to use 4 to 6 tools in rapid succession without stopping his machine. Tools all set up at one time, before the job starts. Time saved, production increased, costs cut. Turret lathe advantages for engine lathes.



Style F McCrosky 4-Way Turret. Takes standard tool bits, 3 indexing positions for each bit. Made in four sizes. Mounted in T-slot of compound rest.

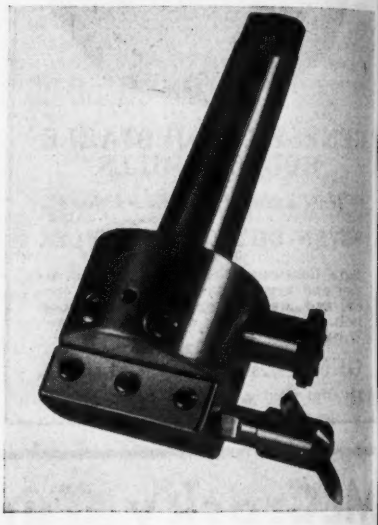
MADE in 6 styles with 3 or more sizes in each style. Patented indexing mechanism is simple, positive, and accurate. All parts ruggedly built for hard work and long life. To find style and size for your lathe, send for Bulletin No. 13-C.

McCrosky Tool Corporation, Meadville, Pa.

on the market by the C. C. Craley Manufacturing Co., Shillington, Pa. The tool is of compact design and rigid construction, and is especially intended for fine work on tools, dies, patterns and metal. It will bore and face work up to 13 in. diameter, and will turn work up to 4½ in. diameter.

The head of the tool is of steel, and is 4 in. diameter by 1⅜ in. long. The sliding block is of high grade oil-hardening steel, tempered, and is 4 in. long, 1½ in. wide, and 2¼ in. deep. It has four openings of ¾-in. diameter to receive the boring and turning tools. Three of the openings are in the front and the fourth is in the end of the block.

The bearing is of the dove-tail type. Tension screws are arranged so that all



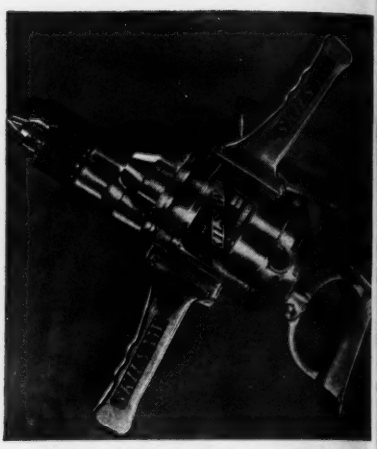
Craley Boring, Turning, and Facing Head

cutting strain is against solid metal. The barrel is graduated in thousandths of an inch, and is provided with a star wheel for adjustment while in operation or it may be adjusted with a socket head wrench fitting into a broached opening in the end of the star wheel. The sliding block has 1 inch of adjustment either right or left from zero.

Skilsaw ⅝-In. Standard Portable Electric Drill

Skilsaw, Incorporated, 3316 Elston Ave., Chicago, Ill., has augmented its line of portable electric drills by the addition of the ⅝-inch drill shown in the illustration. The drill has a capacity of ⅝-inch in steel.

One of the major features of the Skilsaw ⅝-inch Standard Drill is the motor, which is especially designed to deliver the maximum possible power under load. The motor is of the Universal type, for operation on a.c. or d.c., 60-cycle current or less, all voltages, and the armature is dynamically and statically balanced, to eliminate vibration. Field and armature windings are baked in Bakelite and varnish to insure perfect insulation and long life.

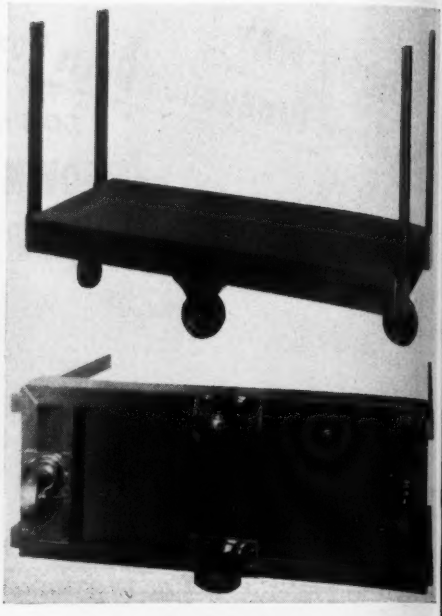


Skilsaw ⅝-Inch Standard Drill

The housing is of die cast aluminum alloy, combining strength with light weight accuracy, and interchangeability of parts. The armature shaft, spindle, and gear shafts operate in ball bearings. The free speed of the motor is 500 r.p.m. Equipment includes a Jacob's chuck, bakelite enclosed switch with patented snuff-arc construction, and super-duty three-conductor cord with unbreakable rubber connectors.

Stackbin All-Steel Platform Truck

In order to make available a truck that is comparatively light and easy to manipulate, yet has the stamina to withstand the abuse to which trucks are ordinarily subjected, the Stackbin Corporation, Troy St., Providence, Rhode Island, has brought out the all-steel platform truck shown in the illustration. The truck is designed so that the platform is comparatively close to the front, making loading and unloading easier. It is of all-welded construction, this construction being intended to eliminate the greater part of the repairs that are usually necessary on factory trucks.



Stackbin All-Steel Platform Truck

The truck is built in one piece, of heavy gage sheet metal, formed into an inverted box section, with undersides formed inward and reinforced with four 4-inch formed steel channel struts, all electrically welded, making a unit that

will retain its rigidity under any load. The casters are of the pressed steel body type, securely welded to the underside of the chassis, making it impossible for them to loosen. Thread guard, rubber tired, or ball or roller bearing casters are optional at slight additional cost.

Standard stakes are of 2 x ½ x ⅛ inch channel, 27 inches long. Other sizes of stakes are optional. The truck is finished in battleship gray enamel, baked on.

Yale Zephyr Hand Lift Truck

To meet the need for a light hand lift truck for loads up to 1,000 pounds, the Yale & Towne Manufacturing Company, Philadelphia, Pennsylvania has brought out the Zephyr Hand Lift Truck shown in the illustration. The illustration shows the handle of the truck at vertical position, which converts it into a push truck. However, this handle can be pulled straight out in front or held at any angle suitable to the user.

The truck will handle a 36 x 42-inch skid platform in a 4-ft. aisle. Steering through a caster wheel permits the use of this truck in a minimum amount of operating space. To elevate the load, the operator grasps the handle, depresses the treadle, and leans backward. His weight in combination with the leverage obtained lifts the load. The handle re-

Yale Zephyr Hand Lift Truck

mains in the position at which it is set. To release, the operator pulls down on the handle, depresses the treadle, and lets

the weight of his body act as a counterweight. The descent of the load is always under control.

The lifting mechanism is of steel and malleable castings. Axles and link shafts are locked to prevent turning or wear in the side rails. Wearing parts are accessible, easily replaced, and any unskilled workman can service the truck. The wide faced roller bearing type wheels and ball bearing swivel caster have a normal rating 50 per cent higher than the truck capacity.

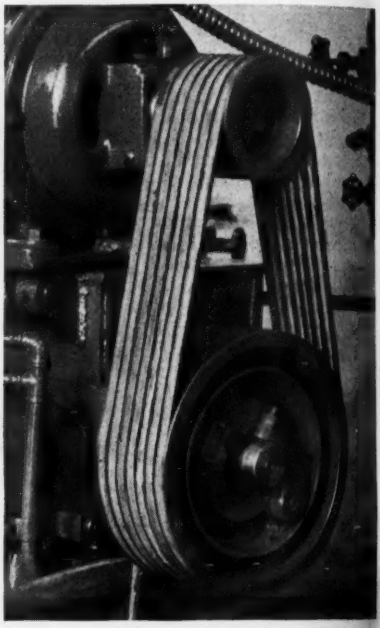
The width of the frame is 18 inches and the lift is two inches with a ground clearance of 1 ⅞ inches. Wheels are 5½ inches diameter x 2 inch face in the rear, and 5 inches diameter x 2 inch face at the front. Hyatt roller bearings are used in the wheels and the swivel caster is ball bearing.

Worthington Multi-V-Drive

An effective solution for many drive problems in a great variety of applications will be found in the Worthington Multi-V-Drive illustrated herewith. The Multi-V-Drive is a unit consisting of a number of endless V-belts running in V-grooved sheaves. It combines a long-life type of rubberized cord V-belt, impervious to dust and moisture, with an improved V-grooved sheave. This combination is said to give a positive grip, without binding or backlash, which transmits power efficiently and economically at high speed ratios over short centers without the use of idlers.

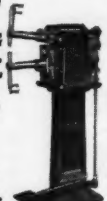
The Multi-V-Drive is a product of the combined research and engineering departments of the Goodyear Tire and Rubber Company and the Worthington Pump and Machinery Corporation, Harrison, New Jersey. The drive is being marketed by the latter organization.

The load-carrying members of the belt are high grade cotton cords arranged in parallel lines and concentrated about the neutral axis. Each cord in the load carries an equal share of the belt load just as each belt in a Multi-V-Drive takes an equal share of the transmitted load.

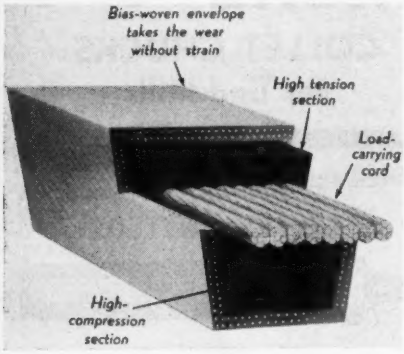


Worthington Multi-V-Drive in operation.

Two sheaves, a driven and a driver, together with the required number of V-



belts make up a Multi-V-Drive. Each of the sheaves is carefully grooved, machined, and finished so that the grooves present a smooth surface on which the belts operate. The wedging action between the belts and grooves results in a slipless powerful grip which compensates for, but differs from, initial belt tension in a flat belt drive. The Multi-V-Drive's smooth grooved construction and the mathematical relation of the grooves to the molded shape of the V-belts results in an effective conformity of belt to sheave which in turn, assures maximum power transmission efficiency.



Goodyear Belt used in Worthington Multi-V-Drive.

General Electric High Intensity Mercury Vapor Lamp

The General Electric Vapor Lamp Company, Hoboken, New Jersey, has perfected a High Intensity Mercury Vapor Lamp which is particularly suitable for high bay lighting. It is a new approach to an industrial white light which is restful to the eye, which enables quick visual response even to details unknown under other commercial lighting. It promotes of continued use of the eyes without fatigue. It is a particularly efficient

General Electric High Intensity Mercury Vapor Lamp

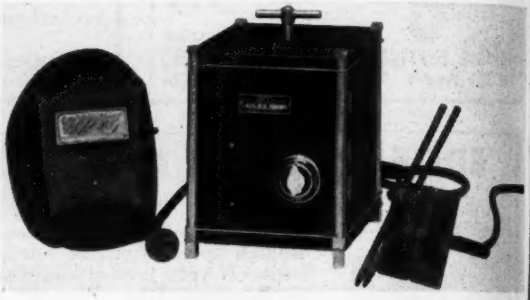
lamp in that it produces 14,000 lumens at a consumption of 400 watts or approximately 35 lumens per watt. It is made with a Mogul screw base for vertical mounting. The lamp has an overall length of 13 inches and is designed for operation on 110 volt and 220 volt, 60 cycle circuits. Average life is 1500 hours.

From a technical standpoint, the High Intensity Light is not white. It is a combination of blue light and yellow-green which produces a whiter sensation to the observer. Due to the practical absence of red rays in the light, true color values are not always rendered when red materials are involved, but this has no immediate bearing in the industrial field where fine color discrimination is rarely called for. The makeup of energy which gives the High Intensity Mercury Vapor Lamp its color quality is interesting in that the major portion of energy is produced in the center of the visible spectrum (yellow-green area) to which eyes respond most efficiently. The balance of the visible energy produced by this lamp is at the blue end, which while it has little visual value does reduce the glare factor and does produce the sensation of a whiter light.

Roffy Arc Torch and Welder

An automatic combination electric torch and welder that will operate on an ordinary 30-ampere light fuse, to be known as the Roffy Arc Torch and Welder, has been developed by the Electric Torch Manufacturing Company, 5321 Horton St., Oakland, Cal. The outstanding features of the machine are its low initial cost and low operating cost, and its efficiency both as an electric and as a metallic arc welder.

As a torch the machine automatically starts and maintains a steady flame in four even steps of heat up to 15,000 B.T.U. at 7,000 deg. F. This purely electrical flame opens a field for high speed



Roffy Size 1 Arc Torch and Welder

soldering, bronze welding, hard surfacing, and so on.

As a metallic arc welder it can be adjusted for fine gauge materials as well as sheet steel in excess of ¼-inch or round steel bars in excess of 1½ inch. The automatic feature not only makes the welding of light gauge materials possible, but also is said to enable almost anyone to produce perfect welds with a few hours' practice.

The machine is made in two sizes. Size 1 has a combination high temperature torch for brazing, soldering, nonferrous welding, hard surfacing, and similar uses, operating from a 110, 60 cycle circuit at 2 k.w. capacity. This size has a three-point heat control switch. The weight is approximately 70 pounds.

Size 2 is equipped with an independent torch and separate welding tongs, four independent heat control switches, and weighs approximately 100 pounds. This model is similar in appearance to the smaller model, but has triple the capacity. It is said to readily weld such light gauge materials as fender and body metals, as well as angle iron, frame material, and so on up to slightly in excess of ¼-inch diameter.

Lyon Steel Box Inserts

Lyon Metal Products, Inc., Aurora, Ill., 1302 River St., offers a variety of metal box inserts for either bench assembly

Lyons Steel Box Insert

or shelving use. The inserts, one of which is shown in the illustration, can be used for the storage of nuts, bolts, screws, washers, rivets, and other small parts used in metal assembly and construction work.

The insert is available in two depths 12 inch and 18 inch, and with either 24 drawers, 18 drawers, or 12 drawers. Each drawer is equipped with adjustable dividers that can be arranged on 1-inch centers to make varying size compartments within the boxes themselves.

CINCINNATI H. S. DIAL TYPE MILLER CATALOG M588. A new "Facts on Features" Catalog M588 has been published by The Cincinnati Milling Machine Co., Cincinnati, Ohio.

The catalog consists of 44 pages which illustrate and describe the 15 outstanding features of the New Cincinnati High Speed Dial Type Millers. The Nos. 1, 2, 3, and 4 Vertical, and Nos. 2, 3, and 4 Plain and Universal machines are covered in the specifications. Four pages of the catalog are devoted to cost reducing attachments which are adaptable to these machines.

Mechanical executives may obtain copies of Catalog M588 by addressing their request to The Cincinnati Milling Machine Co., Cincinnati, Ohio.

ARGUTO OILLESS BEARINGS: To aid those who are familiar with the advantages of the Arguto Oilless Bearing in making out their specifications for such bearings, the Arguto Oilless Bearing Company, Wayne Junction, Philadelphia, Pa., has put out a size chart and price list which gives the dimensions for a wide range of the Arguto Cylindrical Bushings and Standard Arguto thrust washers, and gives the prices. The chart is in the form of a folder which also gives complete directions for installing these bushings. Copies free upon request.

JOHANSON 75,000 R.P.M. PNEUMATIC GRINDER: A folder describing and illustrating this grinder and its uses may be had by addressing the Johanson Tool Corporation, 20 Palmer St., Cambridge, Massachusetts.